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VOL. XXX. SEPTEMBER, 1916. No. 9

THE VALUE OF MICROSCOPICAL EXAMINATION OF ALL TISSUES EXTIRPATED IN THE COURSE OF ROUTINE GYNECOLOGICAL SURGERY.*

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NEW ORLEANS.

I wish to call attention to a certain phase of gynecological work, the value of which I believe is not generally appreciated. I refer to the routine microscopical examination of all tissues extirpated at operation. To those who are making microscopical examinations of all tissues removed, the cases cited here will no doubt appear commonplace and worthy of but little consideration. To the large number of operators, however, who never examine a specimen microscopically unless perhaps it is large or at least grotesque, they should prove of considerable interest.

The cases utilized for illustration, were selected out from considerably over seven hundred operations done in the Charity Hospital gyneclogical service of which Dr. S. M. D. Clark is in charge and with which I am connected. The particular cases selected were singled out especially with the idea of showing clearly the value of routine microscopical examinations, from the standpoints of accuracy in diagnosis and record keeping, prognosis, and treatment.

Personal conviction as to the positive value of routine microscopical examination was arrived at, in great part, as a result of the careful study of over eight hundred pieces of tissue, taken in one year, from patients who were also carefully observed from every other angle. It was quite evident from this study, that while at times an accurate diagnosis could be made from the gross tissue alone, in many cases it was absolutely impossible to make a final diagnosis with any degree of certainty, without the assistance of the microscope. In some instances, where the gross specimen seemed to indicate plainly the exact pathological condition, the microscope proved the diagnosis to be absoluetly incorrect and at times positively tragical in its possible consequences. Naturally, with these observations has come the realization that routine microscopical pathology must assume an important rôle in the intelligent practice of surgery.

*Read at the meeting of the Louisiana State Medical Society, April, 1916. Illustrated with autochrome photomicrographs.

ILLUSTRATIVE CASES.

In the first case selected as an example, No. G. 15-73, the gross tissue might very well have been taken for an enlarged uterus with chronic metritis or fibrosis. One of these diagnosis would probably have gone down in the records and would have been utilized possibly many times over, if statistics on the subject were required. As a matter of fact, the histological examination revealed quite a different picture, and the records show accurately, that the uterus was the seat of a typical adenomyoma and not of a chronic metritis or fibrosis (Fig. 1). From the standpoint of accurate, intelligent, comprehensive analysis of the case, no possible number or varieties of examinations previous to operation, no possible refinements in technic or post-operative care, could ever make up for the neglect of microscopical examination.

An instance of how reliance on gross findings alone could have proven positively ruinous to the patient, as well as a source of deep mortification to the surgeon, is seen in case No. G. 15-94. The signs and symptoms in this case were so palpably those of an incomplete abortion, that this diagnosis was made without hesitancy, in spite of the fact that the woman denied absolutely the possibility of recent pregnancy. At the time of curetting, which was required on account of excessive bleeding, the diagnosis seemed to be definitely established, on account of the removal of several pieces of tissue which appeared to be unquestionably placenta. The routine microscopical examination in this case proved, as shown in Fig. II, a chorionepithelioma. If the diagnosis from the gross tissue alone had been relied upon, the records of the case would have been inaccurate and false, the woman would have been allowed to get up in five days and to go home in seven, and she probably would have died shortly afterward, from rapid metastases. In the meantime, besides all this, the surgeon would have been basking in a fool's paradise, secretly if not openly rejoicing at his remarkable cleverness in discovering that a certain widow

had juggled with the truth. The routine microscopical examination prevented all this and besides gave the woman a chance for her life. She survived an extensive Wertheim hysterectomy and when last heard from was still well. This case illustrates beautifully how at times the surgical treatment depends absolutely on the routine microscopical examination.

Of unusual interest because it involved the ever-present cancer question was case No. G. 15-75. The patient was a woman over sixty years of age, whose uterus was retroverted, large, soft and boggy. She had passed the menopause sixteen years and complained of a profuse leucorrhea. The cervix gave no indication of the cause of the presenting symptom and on account of the uterine displacement, which was difficult to correct, examination of the fundus revealed little more than did that of the cervix. The presence of pus in the fundus could be readily determined, but even after removal of the uterus, section of the gross specimen did not definitely prove that carcinoma was absent. The gross evidence was certainly against carcinoma, but an accurate, dependable prognosis could not be made with certainty, until the microscopical examination demonstrated the presence of a chronic metritis, without carcinoma (Fig. III).

An equally interesting example entering in the same category as the preceding case was found in No. G. 15-156. This patient was brought to the hospital on account of excessive, intermittent hemorrhages which had lasted over a period of two years. She was twenty-eight years of age, and while in fairly good physical condition, she showed evidence of considerable loss of blood. The cervix was somewhat larger than normal and its consistency was exceedingly dense. Apart from the extreme induration, there was no objective suggestion whatever of malignancy. This woman had been previously curetted without permanent result, and the operator reported that a distinct obstruction was encountered in the cervical canal. At the second operation, the same obstruction was again encountered at about the level of the internal os, and the idea of curetting for diagnosis was abandoned. The conclusion was that we were dealing

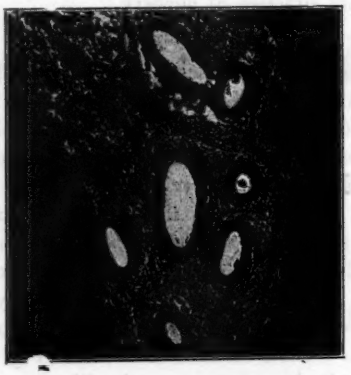

Fig. I. No. G 15-73. Section from a symmetrically enlarged uterus, showing an extensive island of typical uterine glands and stroma. The surrounding smooth muscle fibres can be plainly seen on either side.

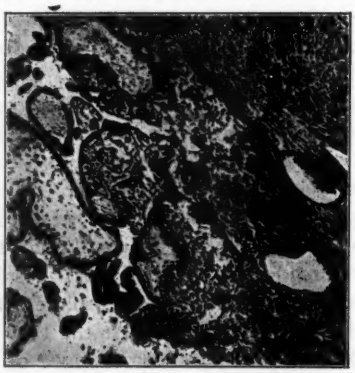

Fig. II. No. G 15-94. Section showing villi with atypical proliferating, Langhans cells, invading underlying structures.

Fig. III. No. G 15-75. Section from uterine wall, showing extensive lymphoid and plasma infiltration, but no evidence of malignancy.

Fig. IV. No. G 15-156. Section from uterine muscle, showing extensive glandular invasion. The glands are numerous, dilated and tortuous. The epithelium is atypical and many mitotic figures can be seen.

with a polypus which could not be readily removed with a curette. Even though the examination of the fundus and adnexa revealed nothing abnormal, panhysterectomy was decided upon on account of the history, the patient's age, her general condition, and the findings on cervical exploration. It was decided to remove the cervix "on suspicion." Not that malignancy was thought to be present at the time, but because it was believed a good prophylactic measure against it. Section of the gross

Fig. V. No. G 15-181. Section from hematosalpinx in which no fetus was found. A number of pseudo-decidual cells are seen, especially under the epithelium of the fold projecting into the lumen of the tube.

specimen revealed again the hard "fibrous" cervix. The fundus also was somewhat harder than normal, but otherwise showed nothing of note. The endometrium revealed nothing startling except that springing from it at the internal os and obstructing the latter, was a definite polyp about the size of an

Fig. VI. No. G 15-181. Section showing decidual cells and villi in a clot recovered from a ruptured hematosalpinx shown in Fig. V.

almond, firmly attached by an indurated base. This was apparently the only cause of the hemorrhage. Routine microscopical examination established the face that we were dealing not only with an adenocarcinoma infiltrating the entire fundal musculature, but also that this infiltration had already invaded to a certain extent the cervix, which was removed purely "on suspicion." Had the gross findings alone been depended upon, or this woman would have been promised certain freedom from recurrence of hemorrhage as well as permanent pelvic good health. As it was, the routine microscopical examination allowed us to warn both the husband and physician of the probability of recurrence. Without the microscopical examination we probably would have felt that we had been somewhat radical in doing a panhysterectomy for nothing but

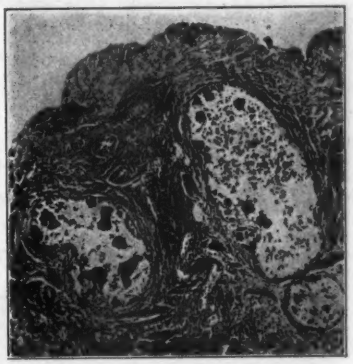

Fig. VII. No. G 15-219. Section showing portion of outer surface of tube. Several dilated lymphatic vessels are seen partially filled with breaking down carcinomatous cells.

a small polyp and a fibrous cervix. As a result of the routine examination, we had definite proof that we erred on the side of conservatism and that the operation the woman should have had was a radical Wertheim panhysterectomy. Section from the fundus in this case is shown in Fig. IV. (This pa-

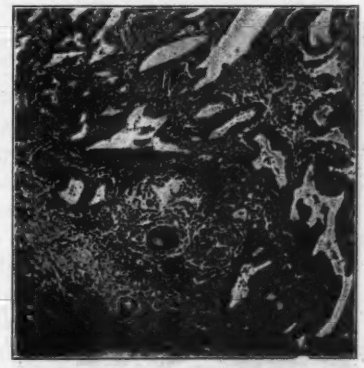

Fig. VIII. No. G 15-133. Section of tube wall showing cellular infiltration with a large, well-defined giant cell below the center.

tient has just returned for examination six months after operation, and there is a beginning recurrence in the vault.)

From the standpoint of accuracy in diagnosis and record-keeping, especially, the group of cases comprising early tubal pregnancies is worthy of more than passing attention. In view of the unusual

amount of interest manifested in this condition as shown by the literature, we do not feel justified in recording for statistical purposes an early tubal pregnancy as such, unless the diagnosis is absolute. The mere presence of a hematosalpinx we do not feel is sufficient evidence of tubal pregnancy, as this condition admittedly may exist independently of tubal pregnancy. In the absence of a fetus, the hematosalpinx must be accompanied by one or more of the three absolute evidences of pregnancy

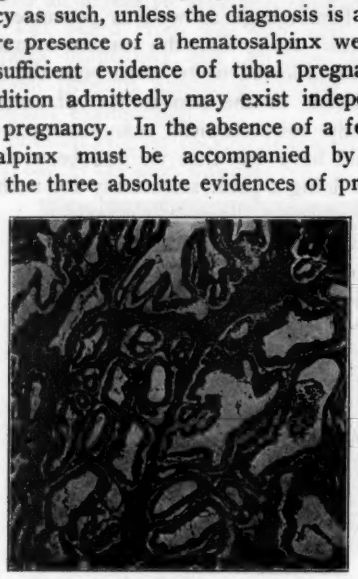

Fig. IX. No. G 15-252. Section of more solid portion of papillo-adeno-carcinoma of ovary, showing the widespread glandular arrangement.

—true decidual cells in the uterine scrapings, tubal or pseudo-decidual cells in the tube (Fig. V), or finally, tubal decidual cells and villi, together or singly, in the clot recovered from the tube or from the abdominal cavity (Fig. VI). This insures a certain degree of accuracy which is impossible without routine microscopical examination.

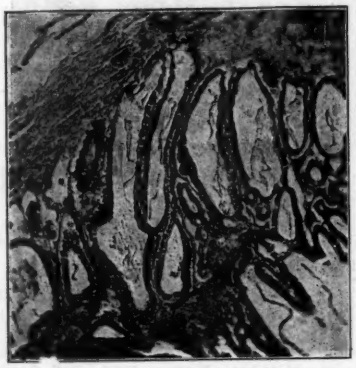

Fig. X. G 15-252. Section of large, unilocular cyst wall forming part of tumor shown in Fig. IX, showing the same histological characteristics as the more solid portion of the growth.

Recently, a rather unusual condition presented itself, in that it was thought that tubal tuberculosis was coexistent with a known cervical carcinoma. The gross evidence in the tubes was so convincing, in spite of the improbability, that there seemed to be almost no room for doubt. The condition was bilateral, the fimbriated extremities were open, the tubes were very much thickened and adherent, and their entire surface was studded with discrete, rather hard, miliary "tubercles." To complete the picture, on squeezing the tube, a considerable quantity of cheesy, thick, yellowish material exuded. Certainly the possibility of tubal metastatic carcinomatosis had to be admitted, but the gross evidence was too much against it for serious consideration. It took but a few moments for the microscopical

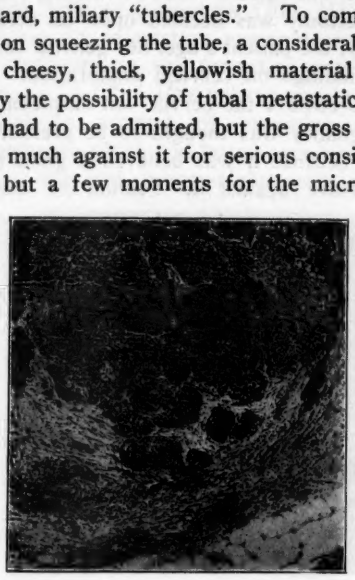

Fig. XI. No. G 15-77. Showing portion of well circumscribed carcinomatous nodule, situated in the parametrium, over an inch away from the cervix.

examination to shatter our erroneous conclusion and to explain at the same time the marked simulation to tuberculosis. Section of the tube for microscopical examination showed plainly that the "miliary tubercles" on the surface were simply breaking down metastatic foci. The fact that these foci were discrete and simulated tuberculosis, was

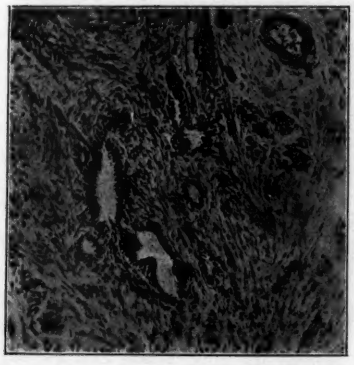

Fig. XII. No. G 15-95. Section from ovary, showing several glands, lined with a single layer of moderately tall columnar epithelium. Aside from the presence of a few such glandular islands, the ovarian tissue in the field is not abnormal.

explained by the evidence, as shown in Fig. VII, that we were dealing with a peri-tubal, lymphatic metastasis.

Some time last year, a very stout, robust, short-coupled individual who was referred for examination, stated that she had missed her periods over

ten months. At the beginning she was thoroughly convinced that she was pregnant. This belief was strengthened considerably by the assurance of her physician when she had missed four months, that questionably this was the case. When the time for delivery came and went without even the slightest simulation to labor or the appearance of a fetus, the woman became apprehensive and some time later began to develop definite pain in the lower abdomen. The uterus at the time was but vaguely

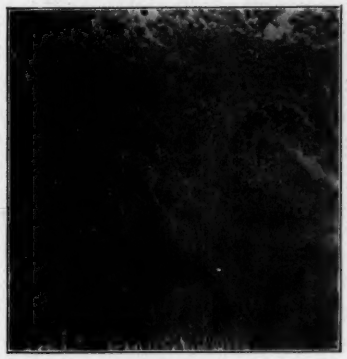

Fig. XIII. No. S 14-361. Section from a mass of tissue composed principally of cells resembling adrenal cells. In the gross, this tissue was supposed to be an accessory ovary.

palpable on account of the fat abdominal wall, and appeared to be slightly enlarged. The adnexa were not distinctly palpable, but were sensitive to deep pressure. The temperature range was between 98° and 101.8°. The white blood cell count was 8.900, the neutrophiles 70% and the lymphocytes 26%.

Fig. XIV. No. G 15-181. Compare with XIII. Section from normal ovary showing lutean cells, resembling somewhat though essentially different from the type of cell shown in Fig. XIII.

From the study of the case two points stood out prominently: 1st, there was a strong possibility of molar pregnancy, as she was too young for the menopause; 2nd, the pain was sufficiently intense to justify exploration. Accordingly, the uterus was curetted for diagnostic purposes, but the curettings were so scanty that none was available for examination. Exploration of the abdomen revealed a conglomerate mass of adhesions involving uterus, adnexa and surrounding structures to such an extent that no conservatism could be practiced and a supravaginal hysterectomy was done, ablating also both adnexa. It seemed marvelous how far astray we had been led by the story of this woman's illness. It appeared inconceivable that we could have thought of such a rare condition as molar pregnancy, when apparently the gross specimen revealed plainly the fact that the condition was nothing but an ordinary, every-day pelvic infection. The appearance of the gross tissue was doubly surprising in that it did not explain the prolonged amenorrhea, as the uterus was not of the firm, contracted, fibrous type, nor was there total absence of functionating ovarian tissue. The routine microscopical examination, however, explained quite clearly the previous unaccountable amenorrhea and gave us as well the only proper, ultimate conception of our prob-

Fig. XV. No. G 15-37. Section from tumor of the round ligament, showing bundles of smooth muscle fibres surrounded by dense connective tissue.

lem, as both tubes were the seat of a typical tuberculosis (Fig. VIII).

Equally interesting was the following case. An emaciated, cachectic-looking young girl with a large pelvic tumor was admitted to the service with a diagnosis of ovarian sarcoma. The abdomen was alarmingly distended and tense, but in spite of this, it was thought that a large, irregular mass could be palpated on the right side. The rest of the abdomen apparently was filled with fluid. This suspicion was increased with the knowledge that a large quantity of fluid had been removed by tapping, before the patient's admission to the hospital. At operation the source of the fluid was determined to be a large cyst, lying next to which and forming part of its wall, was a more solid mass, which was probably the palpable portion before operation. Considerable discussion immediately arose as to the real nature of this ovarian tumor. Many sugges-

tions entirely at variance with each other were freely made, changed, modified and made over again. Sarcoma was still considered by some and ignored by others; sarcoma with simple cystadenoma was suggested; carcinoma alone and with cystadenoma was thought to be a possibility; and finally, even dermoid and cystadenoma alone were temporarily suggested. It remained for the routine microscopical examination to settle definitely the controversy, to make the record accurate, and the post-operative diagnosis correct. Section from the more solid portion of the tumor (Fig. IX) showed an adenocarcinoma, and that from the adjoining large cyst wall showed the same histological characteristics, as can be seen in Fig. X.

Many further examples might be adduced to show the practical value of routine microscopical examinations, but the cases already cited will probably furnish sufficient evidence. In the same manner, the value of this routine form of examination from a purely scientific standpoint, can be demonstrated equally well by the citation of but a case or two more.

Who can appreciate thoroughly, for example, the efficacy of the radical panhysterectomy of Wertheim, without having studied such a specimen as that shown in Fig. XI? This circumscribed carcinomatous nodule was a trifle larger than the size of a large pin head. The nodule was removed from the parametrium, at a distance of from one and a quarter to one and one-half inches from the outermost limits of the lateral margin of the cervix. Suppose, as can be readily conceived, that such a nodule was the only carcinomatous focus outside of the tissue removed by the ordinary panhysterectomy, it would be distressing to realize that such a definite, circumscribed, well-defined, removable area had been so injudiciously overlooked. Considering the subject from this point of view, the attitude that after all the radical hysterectomy with its high mortality offers little more than does the ordinary panhysterectomy, is not even worthy of serious consideration or discussion. Yet thorough appreciation of the Wertheim technic is difficult to obtain, unless such a nodule is occasionally encountered in the course of routine microscopical examination.

Again, from the purely scientific standpoint, where it is simply a question of making a piece of tissue mean more to us than merely a "lump," the routine microscopical examination is indispensable. Fig. XII, for example, demonstrates an entirely unsuspected, interesting condition, in the form of a simple adenoma of the ovary. In Fig. XIII is seen a similar example, in the form of what appears to be, microscopically, an accessory adrenal. This section was made from a case which was thought to have an unusual congenital abnormality in the form of an accessory ovary. The gross tissue resembled an ovary in size, shape, color, consistency and location. Without the microscopical examination, this case would certainly have been recorded as a rare example, on account of the presence in the same individual, of three separate and distinct sex glands of the same type. This case was brought to mind recently by another case in which the presence of a similar condition had to be seriously considered. In conjunction with other pelvic pathology, there was found a hard, elongated mass about the size of a marble, forming part of the round ligament and densely adherent to the right internal inguinal ring. As this was an isolated mass, situated in one of the areas in which accessory adrenals are prone to be found, this possibility naturally came to mind. Speculation as to the real nature of the round ligament growth was unnecessary, however, as the microscope settled definitely the fact that we were dealing with a fibromyoma. (Fig. XV.)

A point which might arise in a general discussion along the lines followed here, is that as a result of routine microscopical examination, the surgeon might be seriously inconvenienced or embarrassed by being confronted at times by reports of microscopically normal appendices, tubes, ovaries, etc. As a matter of fact, the very objection is a strong argument in favor of the method. Certainly the appendix, and to a very much less extent even the tubes, are sometimes deliberately removed for various reasons, even though they are not in themselves diseased. A report of normal tissues in such cases is therefore to be expected. If, however, removal of microscopically healthy organs was required, for example, on account of accidental impairment of the circulation, of superficial adhesions, or of congenital or acquired distortion which might later produce trouble, certainly a negative report in such cases could do no harm. If as occasionally might happen, a deliberate error was discovered, the report here especially would be of inestimable value, because it would probably prevent the repetition of a mistake which otherwise might be remade indefinitely.

Furthermore, as a check, in the practice of conservatism, unquestionably many valuable lessons can be learned from the routine microscopical examination of all tissues removed, especially if at the time of operation they were deemed too much dis-

eased to be left behind. For example, routine microscopical study of all extirpated ovaries, undoubtedly would result in the subsequent saving of untold numbers of these frequently unoffending victims.

It must be granted, of course, that routine microscopical examination of all extirpated tissues cannot be depended upon exclusively in the study of a gynecological problem. The only contention made is that it is a necessary adjunct for the proper practice of gynecological surgery, and that it will often reveal to the unsuspecting eye of the operator many valuable truths in connection with his patient.

Note.—The author is indebted to Dr. John A. Lanford for valuable assistance in making the photomicrographic autochromes utilized for illustration of this paper.

GANGLIONEUROMA.

Ganglioneuroma are not confined to any particular age-period, but have been observed at all ages from early infancy to old age. They tend, however, to be more common in younger subjects, and also tend to be of larger size according as the age of the patient is less. The largest described have been about the size of a child's head. Sex does not appear to be an important factor in determining their incidence.

As a rule, the tumors are encapsuled and quite simple in character, and there are records of successful surgical removal in seven cases, but frequently the deep situation and closeness of the growths to vital organs is such as to render difficult or impossible the removal even of those which are histologically simple.—J. S. DUNN, in *The Glasgow Medical Journal.*

THE QUESTION OF THE PRELIMINARY CATHETERIZATION OF THE URETERS AT THE TIME OF THE WERTHEIM OPERATION.

This has been of value in the development of pelvic operations in the hands of several operators, and it has been particularly used in hysterectomy for servical cancer because the ureters have been injured in this operation more frequently than in all other pelvic operations combined. I believe it is an unnecessary procedure in this operation if one will expose the ureters at the onset and if the operator is familiar with the anatomy of the pelvis.—JOHN A. SAMPSON in the *N. Y. State Journal of Medicine.*

ACUTE APPENDICITIS.

J. GARLAND SHERRILL, A.M., M.D., F.A.C.S.
LOUISVILLE, KY.

While in typical cases of acute appendicitis the symptomatology is usually sufficiently characteristic to insure diagnostic accuracy, several intra-abdominal and intrapelvic lesions have to be differentiated or at least must be considered before the clinician can be certain of his diagnosis; and in some cases considerable difficulty may be experienced.

In the majority of instances the most dependable diagnostic indications are: the leucocytosis, the pain, the rigidity, and the localized tenderness, especially where pain is felt when pressure is made upon the opposite side and suddenly released, i.e., when pressure is made on the left side in acute appendicitis the pain will be felt over the appendix and not at the point of pressure.

(1) In rupture of the sac of a right-sided ectopic gestation, the sudden occurrence of intense pain may mislead the attendant unless he is familiar with the previous history of the patient. Anamnesis will usually disclose evidences of pregnancy. In acute appendicitis sudden collapse is rarely observed, excepting in fulminating cases with rupture; the signs of serious internal hemorrhage are lacking; the circulation and temperature are less profoundly impressed. Vomiting and abdominal rigidity may be present in both lesions, but are more pronounced in appendicitis. Marked anemia is often noted in ruptured ectopic gestation. In many recorded instances diagnostic errors have been made.

(2) In mechanical obstruction to the fecal outflow from any cause, the early symptoms may simulate those of acute appendicitis. However, in obstructive lesions the temperature is commonly subnormal in the beginning, followed later by a gradual rise. The pulse is rarely accelerated, usually slow at first. Physical examination may reveal the site of obstruction some distance from the appendiceal region; borborygmus and other evidences of exaggerated peristalsis are present; vomiting is incessant and propectile, soon becoming feculent. In appendicitis the intestine is quiescent and vomiting is non-projectile, being paralytic rather than mechanical in origin. Intussusception is rare in adults, and acute appendicitis is equally uncommon during infancy. The early appearance of blood in the dejecta, and the presence of a mobile tumor, will make the diagnosis of intussusception certain.

(3) In pneumonia involving the lower right lobe, the early manifestations may be sufficiently confus-

ing to render diagnosis uncertain. While in some instances no pulmonary signs may be at first evident, the increased rapidity of pulse and resporation, and the higher temperature range, are indicative; the pain is greatest above the costal margin; abdominal rigidity is uncommon; the characteristic pulmonary symptoms later appear. The leucocyte count is lower in pneumonia than in acute appendicitis; the blood pressure may be higher in pneumonia.

(4) In cholelithiasis — including cholecystitis, cholangitis, and choledochitis — there is usually a history of previous attacks of right abdominal and epigastric pain, the so-called "hepatic colic," "gall stone colic," etc. Oftentimes the patient will state that he has been treated at various times for "indigestion," "gastralgia," and other misnamed digestive disturbances. Vomiting is a common symptom; pain is higher than in acute appendicitis, and is transmitted to the chest, the back, and the right shoulder. Rigidity may extend to the appendiceal region; the greatest tenderness is just below the costal margin; the presence of choleliths may rarely be determined by palpation; jaundice may or may not be present. Nothing characteristic about the pulse, temperature, blood pressure, or leucocytosis. Röentgenoscopy is claimed by some observers to determine the presence of gall stones, but many stones give no shadow.

(5) In right-sided renal and ureteral lesions, especially if nephroliths or ureteroliths be present, the diagnosis can be perfected by Röentgenoscopy where uncertainty exists. In so-called "renal colic" pain is intense, usually referred to the testicle, the pelvis, or the inner aspect of the thigh, and its location is higher than in acute appendicitis; there is no abdominal rigidity; vomiting is exceptonal. The microscope shows blood in the urine; cystitis is rarely present. Blood pressure is high; leucocytosis unchanged.

(6) In right-sided salpingitis and ovaritis — including small pyosalpinx and ovarian cyst—differential diagnosis may be difficult. Practically every clinical symptom of acute appendicitis may be present, and it requires careful bimanual examination to clarify the existing uncertainty. It is well to remember, however, that the onset of tubal and ovarian lesions is seldom sudden, study of the clinical history will usually reveal evidence of previous attacks of pelvic pain, and as a rule the etiology of lesions involving the tubes and ovaries differs essentially from that of acute appendicitis. The leucocyte count should be higher in acute appendicitis.

(7) In the crisis of tabes, the abdominal symptoms may occasionally suggest acute appendicitis, and diagnostic errors have occurred. According to Nazum (*Journal of the American Medical Association*, February 12th, 1916), of one thousand tabetics, 8.7 per cent were subjected to celiotomy under mistaken diagnoses, chiefly through failure to examine the nervous system. Gastric ulcer, gall bladder disease, and appendicitis, were the diagnoses most frequently made (Nazum).

(8) In typhoid fever, involvment of the appendiceal lymphoid tissue may produce pain and other symptoms of acute appendicitis. When perforation of a typhoid ulcer of the ileum in the right abdominal area ensues during the early stages of the disease, the pain, rigidity and tenderness without increase in the leucocyte count, are characteristic—the presence of rose spots and a positive widal reaction will be sufficient.

One of the most difficult cases I ever encountered where differentiation had to be made between acute appendicitis and typhoid fever with perforation, recently came under observation in the Louisville Public Hospital. I was asked to see a man who had been admitted without any history, but was presumed to be suffering from acute appendicitis. He had not been under the care of a physician, had been feeling ill only a short time, had not been confined to bed, in fact had walked to the hospital. He complained of nothing excepting intense pain in the right abdominal area. The leucocyte count was between 8000 and 9000. The abdomen was tender, there was some elevation of temperature, but the pulse was normal; there was no abdominal distension. The tongue was slightly "furred" but not typically typhoid in appearance; there was slight mental hebetude. Inspection of the abdomen revealed a few small red spots which excited my suspicion, and after a careful examination I concluded the patient was suffering from a perforated typhoid ulcer and not acute appendicitis. The temperature had been below normal, and had gradually risen. This, to my mind, was in favor of typhoid fever, when considered in connection with the leucocyte count, although temperature variations sometimes occur in perforative appendicitis of the fulminating type. The diagnosis of perforation of a tpyhoid ulcer was confirmed by operation.

In April, 1901, I was called to see a woman who had aborted two or three weeks before, and was suffering from pain in the right abdomen and pelvis. Her physician suspected appendicitis. I examined her very carefully; there were no distinctive symptoms, not even slight abdominal rigidity. Pressure over the appendix elicited ten-

derness, but this was insufficiently marked to indicate acute appendicitis. A low form of fever was present, and believing it to be typhoid, I decided not to operate. A few days later I went abroad. Returning in October I was again asked to see the patient, and found present a typical appendiceal abscess. The woman was moribund at the time, and died within six hours. Necropsy revealed three abscesses, one in the pelvis, a second in the right loin, and a third in the right iliac region, all probably being due to appendicitis from which she suffered when I first saw her. This was evidently a case of appendicitis with a slow-forming abscess, and I made a mistake in my conclusions.

A vivid recollection of the foregoing history enabled me to make the diagnosis in another case of appendicitis. I was called to see a man whose temperature range was from 98.6° to 99° F. He had right abdominal pain upon pressure. Operation revealed a ruptured appendix, with a fecalith protruding from it. There were practically no symptoms excepting severe pain. Fever as a diagnostic sign of acute appendicitis is unimportant. I have encountered cases where the temperature was normal. A physician seen in consultation with Dr. William C. Dugan had been under conservative treatment in a local hospital for some time, the diagnosis of appendicitis having been made. His temperature had been normal for a week. He had arranged, against his attendant's advice, to go home the next morning. During that night the abscess ruptured, and as a result the patient had extensive peritonitis.

(9) In tubercular peritonitis and intestinal tuberculosis, diagnostic errors are rather frequently made, particularly where pain is most intense in the right iliac region. Evidences of tuberculosis elsewhere within the economy may not be disclosed by the most careful and painstaking anamnestic and clinical investigation. The initial symptom may be persistent pain in the right lower abdomen. The leucocyte count is diagnostic of acute appendicitis.

Occasionally there is considerable difficulty in differentiating acute tubercular peritonitis from acute appendicitis of the fulminating type. I have seen three such cases where the symptoms appeared suddenly. One of the patients was operated upon for acute appendicitis. Abdominal incision revealed a ruptured caseous gland, and the cavity contained a small quantity of serous fluid. No other treatment was instituted. The abdomen was merely opened, the appendix removed, and the incision closed. The patient promptly recovered, as is so often true in cases of tubercular peritonitis.

Another case was reported before the Jefferson County Medical Association some time ago. The patient was a girl of seventeen, who began feeling ill in September, 1915. Menstruation had occurred at the regular time (September 14th), but continued one day and ceased. She had slight fever and felt ill the next morning, but her distress was insufficient to attract much attention. Her general appearance was good, she was well nourished, but her mother said she had recently lost considerably in flesh. Her grandmother had died of tuberculosis in the home a year previously. She worked during November and December in an office with a gentleman who had a severe cough, and it was later ascertained that he had a desperate case of phthisis. On Friday night this girl came home complaining of pain in her abdomen. On Saturday there was noted considerable distension. She was then seen by the family physician, who found upon palpation that the abdomen contained fluid; there was great distension which resembled a large ovarian cyst. An impulse was noted upon palpating the abdomen, the presence of fluid being readily recognized. There was much tympany, but no distinct area of increased dulness upon change in position. The fluid evidently filled every crevice, but did not reach the surface in any locality. Her temperature had been 103° F., there was severe abdominal pain, and the family physician made the diagnosis of tubercular peritonitis, which I confirmed after a careful physical examination. Rectal investigation revealed an area of induration near the right side of the uterus, which was also thought probably tubercular. Celiotomy was advised and accepted.

At the operation we removed both Fallopian tubes, which were in a state of chronic inflammation, filled with cheesy material, and studded with tubercles. The intestinal surfaces were covered with nodules and "bound together" by adhesions, and the abundant fluid present accounted for the large amount of tympany. The omentum was thick and leathery, and also studded with tubercular nodules. A von Pirquet test was made during the time the patient was in the hospital; it was not distinctly positive, although there was slight reaction in the central portion of the inoculated area. This test is important in attempted differentiation between tubercular peritonitis and appendicitis, but in extreme cases like this, operation should not be postponed awaiting positive differential diagnosis. The leucocytosis will be the better guide. The leucocyte count in this case was 6800.

(10) In cecal and appendiceal carcinoma, the symptoms closely resemble those of acute appendicitis, especially where perforation has occurred, and differential diagnosis may be impossible.

Physical examination reveals no indicative clinical signs, and the same is true with reference to anamnesis, blood pressure, and leucocytosis. Röentgenoscopy is of material value in diagnosis. The finding of occult blood in the stools is important.

In the following instance a mistake was made, i.e., I diagnosed appendicitis, and operation showed a cancer of the large intestine. Examination of the literature on intestinal carcinoma shows that I am not alone in this error. In about ten per cent of cases cecal carcinoma is diagnosed as appendicitis. The reason for this is that carcinoma frequently causes ulceration, there is perforation of the intestinal wall, and abscess formation. In my earlier experience I saw a number of cases of appendicitis with abscesses in the loin. I recall one in particular where a large abscess could be easily outlined; it was opened and drained, and the patient recovered. As the patient gave the history of several recurrent attacks of pain in the appendiceal region, I naturally concluded this was another similar case, but celiotomy revealed a cecal carcinoma with perforation and a retrocecal abscess. There were present all the clinical evidences of appendicitis, therefore the mistake was most natural.

In the majority of the lesions to which attention has been called in the foregoing, the uncertainty in diagnosis is unessential in so far as the treatment may be concerned. Of course, every surgeon would like to be absolutely positive about his preoperative diagnoses, but in lesions involving the right abdominal area experience has shown that differential diagnosis is occasionally difficult, and to postpone operative intervention because of diagnostic uncertainty is usually inadvisable; delay may mean death of the patient. I believe it is the height of surgical wisdom, where sufficient evidence of pathology has been found in the right abdominal area to justify celiotomy, to operate first and perfect the diagnosis afterward.

At the Birmingham, Alabama, meeting of the Southern Surgical and Gynecological Association (1904), I made the statement that in acute perforative peritonitis from appendicitis, I irrigated the abdominal cavity. I now want to change that statement—I no longer use irrigations. I could then see no reason why the surgical profession of this country could not "get together" upon a plan of treating appendicitis, which could be made generally applicable. Finney, of Baltimore, formerly advised cleansing of the intestine and peritoneum with gauze. Blake, of New York, advocated irrigation to remove as much of the infective material as possible, hoping for nature to take care of the remainder. Murphy, of Chicago, merely made an incision and manipulated the tissues as little as possible, depending upon nature to take care of the exudation. He employed proctoclysis. Fowler recommended elevation of the head and trunk.

Practically every surgeon of prominence in this country now believes in early operation for appendicitis, i.e., as soon as the diagnosis can be made. The late Dr. A. M. Cartledge, of Louisville, taught that one should wait until the third or the fifth day, giving the abscess time to form. Such ideas no longer prevail, as it has been shown that operation when the patient is first seen, regardless of when this may be, will give the best results.

When one is forced to treat appendicitis medically, the method of Ochsner is indicated. Starvation keeps the stomach empty and prevents peristalsis, thus giving nature an opportunity to improve the patient's physical condition. Ochsner, however, advocates starvation in every case of appendicitis prior to the institution of surgical treatment. I believe this is contrary to the best surgical teaching. It is now advised by the majority of surgeons that, as soon as the diagnosis of appendicitis can be made, operation is indicated. A few claim it is safer to postpone operative intervention until the physical status of the patient can be improved, under the belief that this plan insures a more prompt convalescence, that if operation be performed within the first few days recovery is slow and the result doubtful. It is my opinion, based upon experience, that if the patient be seen early and promptly subjected to operation, the mortality will be materially lessened; that if operation be performed within the first forty-eight hours the mortality will be no greater than during the interval between attacks.

It is my belief that purgatives have killed many patients with appendicitis. Twenty years ago I was a strong advocate of purging these patients, and my views were largely based upon the following observation: I operated upon a young girl for acute appendicitis. The infection was so virulent that she had gangrene of the colon. Drainage was practiced, and the extruded material was so foul that it caused sloughing of the wound tissues. I believed this was due to the extreme virulence of the discharge. It was then my opinion that by "flushing the bowel" before the operation, thus removing as much of the poisonous material as possible, the attack would be less virulent. I still think if this could be done before infection had developed, appendicitis might be prevented in many instances. After appendicitis has developed, however, purgation disseminates the infectious material and causes general peritonitis.

If forced to treat appendicitis by non-surgical

means, I would put the patient in a sitting posture, administer nothing internally, use proctoclysis, and practice gastric lavage, if there was any vomiting. I would not give any violent purgative drugs, nor would any solid food be permitted. I do not agree with Ochsner, however, that patients seriously ill with appendicitis should be treated by this method, delaying surgery in the hope that sufficient improvement will occur to make operation safer. A fifteen-minute operation may be performed if necessary, and drainage instituted; then the Ochsner treatment may be applied. In that way better results can be secured than by depending upon nature to dispose of the infective material.

I cannot agree in the statement that high leucocytosis is an indication of extreme danger in acute appendicitis; a high leucocyte count simply means that the patient has good resistance. Where the leucocyte count is low, nature has not established the necessary resistance, and the condition is more unfavorable. In many instances the onset is so acute with sudden chills, fever, etc., that resistance cannot be established. When the leucocyte count is 20,000 to 28,000, the patient usually recovers. That, at least, has been my experience.

The best way to treat appendicitis is to operate when the patient is first seen. In former years, patients sometimes persuaded me into permitting them to try and "fight off" the attack. These patients frequently had recurrences, and in those days my mortality was at least fourteen per cent; that, in fact, was the mortality in my first one hundred cases of appendicitis operated upon. In June, 1915, I reported two hundred consecutive cases of acute appendicitis, many of them with peritonitis, operated upon so soon as the patients came under observation, with only one death. I have since had no deaths from acute appendicitis in forty additional cases; that makes a total of two hundred and forty consecutive cases of acute appendicitis operated upon with only one death.

I do not use iodine within the abdominal cavity. Where the appendix is acutely inflamed, and rupture has not occurred—even although the appendix may be distended with fluid, if it has not ruptured this cannot be said to be pus—the appendix is merely removed and the opening in the cecum closed. This entails less likelihood of future fecal fistula and more prompt convalescence than any other plan. The operation ought to be completed within fifteen minutes, and where the abdomen is closed without drainage the patient is practically well within a week. When the attack has progressed to abscess formation, or where the appendix has ruptured and there is a large quantity of pus in the cavity, in my opinion drainage should be practiced. In some instances, however, I have cleansed the cavity as thoroughly as possible by sponging and closed the abdomen without drainage. In certain cases drainage should undoubtedly be employed, and for this purpose I use ordinary rubber tubes with gauze wick, and apply a dry dressing over everything excepting the drainage tract where a hot saline compress is applied. The drain is removed in five to seven days. By pursuing this plan, doing as little manipulation within the abdominal cavity as possible and completing the operation quickly, the patient is given the best chance of recovery.

Some will say, in cases where abscess has formed, shall the incision be made over or internal to the abscess? It has been my practice to open the cavity internal to the abscess, and, after thoroughly packing with gauze about the sac, to rupture and evacuate the pus, then after excising the appendix and closing the cecal opening, to remove the gauze and insert a drain.

As to removal of the appendix: If prolonged operation be necessary, with consequent increased shock to the patient, it is advised that the appendix be not removed; but wherever it can be done without additional risk to the patient, the appendix should invariably be removed at the original operation. In this way further leakage is prevented, and it must be remembered that leakage from an infected appendix carries poison into the abdomen.

Irrigation of the cavity was discontinued, because it was found utterly impossible to cleanse it thoroughly. After irrigating until it was supposed everything was perfectly clean, additional exudative material was discovered by inspection. Diluting the toxins renders absorption more rapid, and the patient becomes quickly poisoned. It is better to push the intestines aside in general peritonitis, then insert a large sponge into the pelvis for a few minutes to absorb as much of the exudative material as possible, and then complete the operation as quickly as practicable. I no longer irrigate; nor do I "pour iodine solution into cavity" according to the method of Crisler. The latter is believed not only to be a dangerous but an unnecessary procedure. It has been demonstrated by recent experimental tests upon rabbits and other animals, made by three competent observers, that a two per cent solution of iodine caused peritoneal adhesions. Crisler's statistics show about five times as many secondary operations for the separation of adhesions following the "pouring of iodine into the cavity" than where iodine was not so used.

As to the question of drainage through the loin:

For many years I have not employed this method of drainage. My plan is to use one, two or three rubber tubes, as may be necessary—but rarely more than two. The tube is of the ordinary soft rubber type, split from the proximal end to where it protrudes from the incision; sometimes sheet rubber and gauze are used, making the so-called cigarette drain. All that is required is a vent so that in case of re-formation of the abscess a tract is provided through which the fluid may find exit. It must be remembered that gauze, rubber tubes, or any other kind of drainage, removes very little pus. Persistant use of the hot pack is advisable. When the hot pack is removed a small amount of serum or pus may be noted.

The post-operative management of acute appendicitis is also important. Many patients are killed after the operation by improper treatment. Crile believes the kidney is primarily responsible for death in many of these cases from acidosis following the anesthetic. He says if the patient be thoroughly narcotized after operation death does not ensue. It is my practice to give morphine, if there is sufficient pain or discomfort to require it; if the minimum amount of damage has been inflicted by manipulation within the cavity, one dose of 1/6th grain morphine will suffice. I disagree with Crile that the patient should be narcotized, as this in itself might cause acidosis. If the patient's abdomen becomes distended, or there is vomiting before or after the operation, gastric lavage should be practiced several times if necessary; enemata may also be advantageously employed. Nothing will relieve abdominal distension like gastric lavage and properly given enemata.

I do not care whether my patient after appendicectomy has an alvine evacuation within four days or not. In my opinion much harm has been done by the giving of purgatives shortly after operation—as was the almost universal custom until quite recently—fearing that the patient would die unless the intestinal contents were promptly evacuated. The patient is placed in a sitting posture within an hour after the effects of the anesthetic have been dissipated; proctoclysis is used in every case where the condition of the patient demands it; the stomach is irrigated when necessary. The patient does not get any food until nausea has ceased; water is allowed *ad libitum*.

One of the most serious cases of acute appendicitis that has ever come under my observation occurred in a girl aged three and a half years, who had been ill several days before I was called. She became progressively worse, and there were symptoms of rupture of the appendix about ten o'clock at night; she was taken to the hospital and operated upon the following day about noon. Although *in extremis* at the time, she made an uneventful recovery.

If the patient has enough resistance to assist in overcoming the infection, if the operation be performed with as little trauma as possible, and if an anesthetic be used which will not cause the liver cells to be embarrassed, recovery should be the rule. In several of my earlier operations when chloroform was used as the anesthetic, the patients later had intense jaundice with evidences of profound toxemia, and until attention was called to the fact that the liver cells were disintegrated and destroyed by chloroform, we were at a loss to account for the development of these symptoms. During the "chloroform days" when my mortality was high, some of the deaths may have been correctly attributed to the after-effects of this drug. At present I am using nitrous oxide gas with just enough ether to relax the patient, in some cases gas entirely; in young children chloroform is sometimes employed; but in the appendicitis of adults gas and ether are preferred.

As to treatment of the colonic wound after excising the appendix: The appendix is first clamped with two Halstead forceps, gauze is packed around it to prevent the cavity from being soiled, the gauze being pushed well downward to make room for the scissors, and the appendix is then severed flush between the two clamps. A Lembert suture is so arranged that when the forceps are removed and the suture tightened the cecum is perfectly smooth, no stump of appendix being left to slough. This method is not original with me, Deaver, of Philadelphia, having employed it for several years. I began its use, however, without knowing it had been devised by someone else. The operator must be certain in every instance that hemorrhage has been arrested. After making the necessary traction upon the suture, the two ends are tied; when the knot has been made tight the cecal opening can barely be seen; with a straight needle and linen thread a pursestring suture is then introduced which entirely closes the opening. Since adopting this method of dealing with the appendix, not a single fecal fistula has occurred in my practice. Formerly when a ligature was passed around the appendix, the stump being invaginated and gauze packing inserted, fecal fistulæ followed in several instances from sloughing of the stump, cutting away of the ligature, or other causes.

The contact of gauze with the intestine is likely

to produce fecal fistula. When the gauze is removed the intestinal peritoneum is damaged, and a fistula is the logical result. The gauze should not be allowed to extend to the intestine. If an ordinary rubber tube is used the distal end should be left intact to prevent exposure of the gauze; thin rubber sheeting may be used in similar manner, the gauze barely reaching the edge. In this way the intestinal peritoneum cannot become engaged in the gauze mesh, and when the drain is removed the tissues are not damaged.

APPENDICITIS—A RECORD OF PERSONAL EXPERIENCE IN 1915.*

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A few years ago Codman described a system for recording the final results in operated cases, which he had instituted in his hospital in Boston. This, the so-called "end-result system," aroused the interest of the surgical profession, with the result that many hospitals have adopted it, in some modification, and surgical organizations have appointed committees to devise methods for its general application, and to encourage its use.

The surgeon is at a distinct and considerable disadvantage in comparison with the internist. He frequently turns his patient over to the family practitioner soon after an operation, or he operates out of town or upon a patient from a distance, who leaves for home immediately after release from the hospital. Generally speaking, the surgeon loses touch with his case soon after recovery from the operation.

The end-result system impresses upon the surgeon who employs it the fact that the immediate technical success of an operation is only one of the important desiderata. The patient comes to the surgeon to be relieved of a certain set of symptoms, and the ultimate success of the surgical treatment should be measured in the terms of such relief. An appendicectomy, for instance, which leaves the patient with a weak or bulging scar, with neuralgic pains, or griping constipation which may persist indefinitely or require secondary operation, is not a complete and unqualified success from the point of view of patient or of the recommending physician.

The advantages which the individual surgeon may derive from the study of personal cases are just as great as those acquired from the massed statistics of a large hospital. It is only by this sort of observation and study that the surgeon can perfect his technic and obviate minor and distressing complications. Ordinarily a surgeon gradually acquires the tenuous excellence which we call judgment, as the result of the mentally recorded observation of years. Some form of the "end-result system" will undoubtedly crystalize his results so that he can have the benefit of his experience in a tangible form after a much shorter interval.

There are undoubtedly hosts of surgeons who are applying this system in one form or another in their records. Beginning with 1915 I started a scheme of recording my personal operations in such fashion as to make them readily accessible for following up, and about April 1, 1916, I rounded up the results for the preceding calendar year. This tabulation, although from one point of view simply a statistical study, has nevertheless afforded me considerable interesting information.

Naturally such personal statistics are not so complete as those worked up on a strictly hospital clientele. My plan was to get into personal touch with every patient upon whom I had operated during the year, so as to learn his or her present condition, but I gave this up for several reasons. First, it would require more effort than it would justify, and, second, I felt that where the patient had been referred by a general practitioner he might not take kindly to the idea. In this tabulation, therefore, I recorded simply what I knew by direct observation about each patient, and what I found out by inquiry; I think it may be taken for granted that all the complications and sequelae have come to my knowledge.

During the year 1915 I performed 303 operations requiring an anesthetic. As I do general surgery, I listed these cases roughly by divisions, so as to facilitate comparative study as follows:

Abdominal.
Bones and joints, including osteomyelitis and fracture.
Orthopedic operations.
Neurological-brain, cord and peripheral nerves.
Thorax, empyema.
Breast.
Pelvic.
Genito-urinary.
Rectal.
Infections of the soft parts.
Miscellaneous.

Naturally the form of listing will depend largely upon any given man's practice or predilections, but with the list of operations for the year at hand, a convenient classification can easily be worked out.

Under each division I made clinical subdivisions

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to include all the conditions for which I had operated. Then under each heading a separate entry was made for every case—age, sex, diagnosis, operation performed, result, stay in hospital, end-result, remarks. Many of the operations were of a less usual type and were done only once or a few times during the year. Others represented operations of small moment, such as incisions for infections, removal of superficial tumors, etc.

It would be uninteresting and laborious to present here the notes which I made on each of these subdivisions, but as an example of the way I went at it I shall briefly summarize my appendicectomies, this being the operation which I performed the greatest number of times during the year, with some remarks on technic. I present these statistics without flourish, not as representing a large series, or a low mortality, or distinctive methods, but simply to record a personal experience.

Of appendicitis I operated upon 71 cases during the year 1915. Of these 41 were male patients and 30 female. The youngest was 12 years, and the oldest 50, the average age beeing 26. For convenience in classifying I have divided these into five divisions: the interval or quiescent cases, the acute undrained, the acute drained, the appendix abscess, and the general peritonitis.

Of the *interval* or *quiescent* cases there were 8, of which 6 were in women. In all but 2 of these the muscle-splitting or gridiron incision was used. There were no casualties or untoward complications. The average stay in the hospital of the patients in this group was 13 days.

The end-result in these cases has been good.

Acute undrained appendix. Eighteen cases, of which 12 were in women. The gridiron incision was used in 11 cases and the right rectus in 6. All the male cases were by gridiron incision, except one. One male of 20, who entered the hospital in a serious condition, died 48 hours after operation of septicemia. One male of 18 developed pneumonia on the fourth day and was discharged well on the 31st. Of the remainder, the average stay in the hospital for gridiron cases was 11 days, and for the right rectus 15. The pathological report on some of these cases was "chronic" or "healed" appendicitis, but all had acute signs at the time of operation, and were surgically acute.

One patient, a woman who had been under treatment for neurasthenia before the attack of appendicitis, had a recurrence of pain about a month after operation. The pain was severe and persistent. She desired re-operation, but nothing surgical could be made out, and I placed her in the hands of a neurologist, who has had some success in relieving her complaints. Otherwise the final results have been good.

Acute drained cases. These were drained either because of the presence of free serous fluid, or on account of the condition of the appendix. There were 19 cases, 5 in women. All were gridiron incisions, except 4. A gangrenous appendix was found in 11 cases; and free fluid in 8. One woman of 26 years had a continued fever following operation and was found to have phthisis. Her sinus drained for a month and she was discharged to a sanitarium on the 41st day. It is likely that the appendix was tuberculous, but we had no pathological report. One male of 30 had a sloughed retrocecal appendix, which was removed with great difficulty. He showed signs of internal hemorrhage, and on the 9th day I re-opened him under gas-oxygen and tied off a small oozing point behind the cecum, following this by a transfusion. He was discharged, well, on the 41st day. Except for these two cases the average stay in the hospital was 19 days.

One patient, a woman, returned four months after discharge with pain simulating appendicitis. *X*-rays revealed a stone in the ureter, which was removed by operation. Another patient discharged two buried chromic gut sutures through a stitch abscess. Otherwise there was no complication.

Appendix abscess or *localized peritonitis*: Thirteen cases, of which 4 were in women. Seven were opened by the gridiron incision, 6 by the right rectus, including all the women. The right rectus incision was used in women, because it is often difficult to differentiate between an appendix abscess and a pus tube. The right rectus incision was used in the male when the abscess mass occupied a position near the median line. Free fecoliths were found in two cases. The appendix had sloughed off at the base in one case, and in another it was pulled off in handling. In all the appendix was found and removed. One girl of 16 had a toxic erythema on the 13th day, simulating scarlet fever. Average stay was 21 days. No complications.

General peritonitis: Under this heading I include 13 cases in which there was pus or purulent fluid free in the abdominal cavity. Of these 3 were in women. Seven had the gridiron incision and 6 the right rectus. In about half of these cases two drains were placed, one, a cigarette drain, to the pelvis and the other, of iodoform gauze, to the base of the appendix. In 6 the appendix was gangrenous. In one the general condition did not justify exploration and the appendix was not found; a but-

ton-hole was made in the flank for drainage. All were kept in the high Fowler's position, and starved for 48 hours, during which period the continuous rectal drip (10% glucose in water) was maintained. One male, 27, with advanced phthisis, died 6 hours after operation. His peritonitis was of 3 days duration, and he showed a pre-operative white blood cell count of 71,000. One male of 44 died on the 6th day from septicemia. A girl of 17 and a boy of 18 developed toxic erythema, the girl being transferred to the contagious department of the City Hospital as scarlet fever on the advice of Dr. Place on the 5th day. Excluding this case and the 2 that died, the average stay in the hospital was 22 days.

The question of when to operate has been the subject of a certain amount of discussion. I believe that, generally speaking, the best time to operate is as soon as the diagnosis is made. Six times in the year 1915 I met mild cases of appendicitis in whom for one reason or another it was extremely desirable to avoid or postpone operative treatment. In these cases the expectant treatment advised by Oschner, with some modification, was employed. Two of these cases were operated upon later in the quiescent stage, 3 have had no further trouble, and the other has had two similar attacks since, but has not yet been operated upon. Otherwise I have never postponed operation when the presence of localized pain, tenderness with or without spasm, and fever or increased leucocyte count made it evident that some inflammatory process was going on in the right lower quadrant of the abdomen. This position has been justified by my experience in finding gangrenous or perforated appendices in the presence of very mild local or constitutional symptoms. I have consistently disobeyed the rule not to operate upon patients between the fourth and ninth days, and I see no reason for regret.

The anesthetic has been ether by the drop method, except that in children I have sometimes used the closed cone. I operated a few times under gas-oxygen, and once under novocaine, but I have had much more satisfaction with the ether, and I prefer it, even in desperate cases, when properly administered. If preceded by morphine with or without scopolamin, very little ether may be required in persons who may not stand it well. I use morphine, however, only in exceptional cases. Under ether anesthesia one can operate rapidly and, if the administration is smooth, with a minimum of shock.

The preparation of the patient consists in shaving the operative field and the administration of a low suds enema. In emergencies the enema has occasionally been omitted. The skin is prepared on the table, using benzine, iodine, Harrington's solution and alcohol, in sequence. If applied so that the solutions do not run on the skin, there will be no irritation or eczema. This preparation leaves a narrow frame of iodine marking the limits of the operative field, which preserves natural color.

Generally speaking, I practice the muscle-splitting or gridiron incision which I learned years ago, and which has been described in detail (Crandon and Scannell, *Boston Med. and Surg. Jour.*, 1905, CLIII, 711). This technic allows of a direct and rapid approach, without destruction of nerve or muscle fiber, and practically without hemorrhage. In clean cases it brings one down onto the cecum near the base of the appendix, and if an abscess is present it allows of a short and direct drainage tract, which does not soil the general peritoneal cavity. Oftentimes it opens external to the line of adhesion of omentum to anterior abdominal wall, and as a result the abscess can be treated practically as if it were without the peritoneal cavity. With this incision I do not wall off, because in clean cases it is unnecessary, and in infected cases it serves no useful purpose and disseminates the infection.

The wound is easily closed; a running catgut stitch for peritoneum, a catgut mattress suture for each muscle layer, transversalis, internal oblique, and aponeurosis of the external oblique, and a subcuticular silkworm gut stitch in the skin. The short horizontal scar is hardly noticeable. In drained cases I have sometimes sutured only peritoneum and skin and allowed the other layers to close by their normal contraction. I have never seen hernia following this operation, even in drained cases, and I believe it to be practically impossible, one reason being that the nerve supply to the muscles is not damaged.

For drainage I use a cigarette wick placed to the base of the appendix or into the abscess, if such exists. This wick is partially removed on the fourth day and taken out on the fifth. If, in the presence of a copious discharge, a sinus persists, it is dilated every second day with the little finger and balsam of Peru poured directly into the wound, the skin edges being approximated by adhesive straps. In cases of general peritonitis I ordinarily place two drains, a short one of iodoform gauze to the base of the appendix and a long cigarette wick into the pelvis; the iodoform drain is removed entirely after forty-eight hours and the cigarette wick is loosened on the fourth day and removed on the fifth. Thereafter a short rubber dam wick may be inserted for several days, to keep the skin edges apart.

Occasionally when the cecum is displaced upward

and a softened or mushy appendix is adherent behind the cecum, or deep down in the pelvis, there is a certain amount of difficulty offered by this incision. In this case I do not hesitate to cut upward along the lines semilunaris, first extending the skin incision. This can be done after a little experience in such a way as to afford ample space, and leave a wound that can be repaired adequately and easily. It is only rarely necessary, however.

I do not employ the muscle-splitting incision in young children, in women in whom there is a question of tubal infection, or in those cases of appendix abscess where the tumor can be felt near the median line. I do not use it where exploration is intended. When the diagnosis of appendicitis can be made with confidence, McBurneys to my mind is the incision of choice.

As for after-treatment in clean cases the patient is allowed water immedately upon request. Food is omitted for 24 hours, morphia being given sparingly when needed. After 24 hours the patient is given broths, malted milk made with water, and orange albumin as desired, and a suds enema is administered. On the next day he is started on a diet of soft solids. If all goes well, he is allowed to sit up in a chair for a half hour on the fourth or fifth day, and thereafter for increasing periods. The stitches are removed on the eighth day, and adhesive strapping applied over the wound. Drained cases are allowed to sit up after the drain is out, as soon as the temperature is normal, provided the discharge is limited and the wound is well strapped. Right rectus incision cases are not allowed up in a chair until the stitches are out. Drained right rectus cases may require an adhesive supporting belt for several weeks.

The peritonitis cases have been treated by withholding food and water by mouth for 48 hours, maintaining the Fowler position, administering 10% glucose solution or water by rectum in sufficient quantities, and giving suds or milk and molasses enemata frequently as indicated. Recently I have acquired the habit of using pituitrin to forestall or relieve distention, and I have given six or more ampoules in 24 hours in severe cases, always, it seems to me, with benefit. I have not refrained, however, in cases of severe distention from using the time-honored methods of stupes, drastic enemata, and gastric lavage in the rare instances when they have been indicated. Moderate stimulation has been given when necessary and morphia has been avoided.

The mortality in this series has been moderate. I have lost 3 cases out of the 71, approximately 4%. Of these, 2 were cases of general peritonitis, of whom one was operated upon as a forlorn hope. The mortality in the general peritonitis cases was 16% and in the other 4 classes together was less than 2%. It is interesting to note that of the 26 quiescent cases three-fourths were in women, of the 18 acute undrained cases two-thirds were in women, and of the 45 drained cases, only one-fourth were in women. The mortality was all among males.

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CHOLELITHIASIS.*

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Biliary concretions are the result of disturbed metabolism. They consist of normal elements of the bile in allotropic or pathologic form. Usually they are composed of cholesterin and bilirubin-calcium. Calcium sulphate and calcium phosphate are less frequent constituents. Iron, copper, zinc, and mercury have been found exceptionally.

Some of the concretions are pure cholesterin. Most all "gall stones" contain cholesterin in at least eighty or ninety per cent. The cholesterin may be either amorphous or crystalline and laminated. Bilirubin-calcium very rarely is the chief constituent of a calculus. It is usually present in quantity less than ten per cent.

Calculi vary in size from the so-called "gravel" tone one which fills the gall-bladder. The homogeneous calculus is seldom seen. On section the calculus usually appears to be the result of electrosynthesis; it has a nucleus, and is laminated and crystalline in formation. Cholesterin, bile pigments, bile-resin (Loomis), lime salts, mucus, epithelium, biliary acids, margarin, nematodæ and microbes enter into its make-up.

Normal bile is composed of the pigments—biliverdin and bilirubin, fats, soaps, cholesterin, lecithin, sodium salts, sodium glycocholic and sodium taurocholic acids, mucin, nucleo-albumin, carbon dioxide; chlorides, carbonates, phosphates, and sulphates of the alkalies and of calcium and iron. Enzyme, colloid, lipoid, and electrolytic (and electrifiable) substances united with oxygen effect the changes of bile metabolism.

Bile is both the external secretion of the liver, and the excretion of certain systemic products of metabolism, as cholesterin. Bile is secreted under 15 m.m. pressure; hence, higher than the portal blood pressure. The liver is therefore a high-pres-

*Read before the Grayson County, Kentucky, Medical Society, April 27, 1916.

sure organ. Bile is continuously secreted; the amount in twenty-four hours usually reaching one to one-and-a-half pints. It is excreted only at certain periods. Therefore, we have a bile secreting, and a bile excreting, mechanism. Both are affected in cholelithiasis. The excretion is effected by means of the rhythmic contractions—every fifteen or twenty seconds—of the gall bladder and the muscled bile ducts. Its secretion is greatly augmented by the ingestion of food. This acceleration continues up to the fourth hour, then the secretion diminishes.

The ingestion of food causes a great increase in the quantity of blood passing through the abdominal viscera. That the increased biliary secretion was not due to the quantity of blood was proven by the use of gamboge. This irritated the gastro-intestinal mucosa, caused an increase in the visceral blood flow, but did not affect the biliary secretion. Likewise food was injected into the blood without increasing the rate of bile secretion.

Pancreatic secretion is similar to that of the bile in most respects, and may sometimes be a gall stone factor. Anatomically, the duodenum, the cysto-hepatic and pancreatic ducts are lined with continuous mucosa containing columnar cells, that secrete mucin or a nucleo-albumin. In the duodenum this mucin is the well-known "secretin," with its entero-kinetic action. From analogy we must conclude the secretion and excretion of both bile and pancreatic material are governed by a cysto-hepatic and pancreatic "secretion." Also that these various "secretins" are hormones controlled by autacoids or chemical messengers sent from the posterior pituitary body. These autacoids are probably hormones or stimulators so long as secretion should be increased, and later become chalones or inhibiting chemical messengers when secretion should be checked. The inhibitory chalone may come from the suprarenal principle, which in its turn has been activated by the pituitary hormone. Certain it is, the secretion of bile is controlled entirely through the blood influence, since all the hepatic nerves may be divided without affecting biliary secretion. It is likewise certain the pituitary principle excites peristalsis similar to duodenal secretion. Hence, it appears a posterior pituitary hormone conveyed by the blood activates these cysto-hepatic "secretins" or hormones causing both the rhythmic contractions in the gall bladder and the non-striated ducts, and the increased rate of bile secretion. The part played by the thyroid secretion and by the calcium electrolyte, just here, has not been interpreted.

Cholesterin, the chief ingredient of most gall stones, is a mono-atomic, unsaturated, secondary alcohol. Its formula is now regarded as $C_{27}H_{46}O$, and it belongs to the terpenes. It occurs in nearly all animal fluids; it is especially abundant in the brain. It is also found in tuberculous masses, pus, old cysts, tumors, etc. It appears to be a product of systemic metabolism that is largely excreted by the liver and epithelium of the bowel.

Cholesterin belongs to the now popular class of lipoids, i. e., "substances that cannot be saponified as fats, but may be extracted by means of ether, chloroform, alcohol, acetone," etc. Lipoids possess a detoxicating action. The power of the liver to combat poisons depends greatly upon its lipoids. Cholesterin protects the red blood cells; it prevents the hemolytic action of saponin and certain other bodies. Cholesterin is held in solution in the various fluids by lecithin and alkaline salts of the fatty acids. Cholesterin is found in greater quantity in the bile of the gall bladder (1 per cent.) than in that of the ducts (.16 per cent.). It is four times as abundant in the pregnant as in the non-pregnant. In the young lecithin is usually present in double the quantity of cholesterin.

The second important constituent of biliary calculi — bilirubin-calcium — is sometimes amorphous and sometimes crystalline. It occurs in animal fluids as a soluble alkali-bilirubin. It is slightly soluble in ether, benzine, carbon-disulphide, amyl alcohol, fatty oils, and glycerine; it is more soluble in alcohol and chloroform. Super-saturated solutions are easily formed.

Thus it may be seen biliary calculi are allotropic forms of normal bile constituents. Gall stones, however, never form in normal bile. If the outflow of bile be stopped, mucin or the "cysto-hepatic secretin," which should be used up in the performance of its function of stimulating contractions, accumulates in the gall bladder. Mucin causes stagnated bile to putrefy. Putrefactive changes in bile destroy its anti-septic action, and thus micro-organisms are permitted to live and excite the so-called lithogenic catarrh of the cystohepatic mucosa.

Lecithin, which is the chief factor in preserving the fluidity of cholesterin, is broken up by bacteria, acids and alkalis into substances no longer capable of holding cholesterin in solution; wherefore the precipitation of cholesterin concretions. Mucin is acid in reaction, hence in biliary stasis its accumulation alters the reaction of the bile.

It has been shown that alkali bilirubin-calcium may exist in supersaturated solutions. Consequent upon lowering the alkalinity of the bile by acid mucin, bilirubin-calcium must be precipitated.

The changes produced by bacteria are probably chemical, since the inflammation excited causes the epithelium to discharge sero-albumin and lime salts.

The calcium molecules furnish the electrolytes; a foreign nucleus is found, and by electro-synthesis a laminated calculus is formed which varies in degrees of crystallization, probably according to the age of the stone.

The same position is adhered to now, as in the paper upon this subject read before the Kentucky State Medical Association, in 1907; namely, that by far the greater number of gall bladder disorders occur from chemical reactions due to faulty metabolism. (Even when micro-organisms are present, it is believed precipitations are produced by chemical changes.) This is borne out by the fact that the smaller percentage of calculi show bacteria, also that gall stones occur most frequently in the periods and under conditions most characterized by disturbed retrograde metamorphosis, with organic acids in the system. Thus in pregnant women stasis is more apt to occur, and the bile contains four times as much cholesterin as normal. Yet the resistance to bacteria is relatively high.

Thus the great predisposing causes of biliary concretions may readily be seen to be all things favoring biliary stasis, as gastro-enteroptosis, tight lacing, occupational pressure, as in the cobbler, etc., etc. Likewise the age, hygiene and food conditions favoring acidemia, and disturbances of metabolism. Organic acids in the system liberate calcium in the circulating fluids of the body; calcium in the bile, by its electrolytic and chemical actions, breaks up the lecithin, unites with the fatty acids, changes the reaction of the bile, and causes precipitants. Certain colloids are thus precipitated. Hence, a gouty diathesis is a strong predisposing factor. Likewise a disturbed hormone balance due to disease of any of the endocrinous glands, especially the thyroid and ovaries.

Degenerative changes in the liver, gall-bladder and ducts, and in the intestines, have been observed after thyroidectomy by Lorand, Bouchard and Neusser. The apparent explanation of this probably also includes the relation of the splanchnic nerve. The abdominal visceral circulation is controlled by the splanchnic nerves. Their vaso-dilator effect is probably dependent upon the thyroid secretion. Naturally a constant diminution of blood to these structures (due to the absent thyroid) would be attended by visceral atrophy. Hence, the pituitary hormone, activating the secretin hormone, will still require the thyroid hormone to enable an adequate blood supply for functional activity.

Upon these postulations we would expect, and do observe, the following phenomena: In all conditions attended by cholesteremia, acidema, bacteremia, and biliary stasis, the early manifestations of cholelithiasis may be anticipated. The most frequent of these occurrences are: pregnancy, menstruation, the period of retrograde metamorphosis, states of disturbed hormone balance, as in cretinism, etc., infectious diseases, habits favoring biliary stasis and gastro-enteroptosis or other biliary obstruction.

The early symptoms are: headache, malaise, disturbances of digestion, especially those due to absence of secretion—gastric, duodenal, pancreatic and biliary—diminution of bile in the stools, urinary concentration and toxication, and possibly bile pigment in the urine. There may be a sense of discomfort, and sometimes pain, in the epigastric region. This is the time the "innocence of the general practitioner" in not observing the "innocent stone" is only equalled by the innocent surgeon who cuts down and finds no stone.

Jaundice has excited a great deal of discussion. In the light of the biliary changes that we know occur during biliary stasis, it may be stated biliary concretions need not necessarily form when normal bile is held in the passages. Since the addition to the bile of added waste products, of acid nucleo-albumin or secretion, and also of bacteria, are very likely to occur during stasis, the conclusion must be that precipitations are certainly greatly favored by stasis. Concretions thus formed may or may not be passed out as soon as the occlusion is overcome. Furthermore, the liver secretes bile under relatively high pressure, hence it continues to secrete bile and pass it into other liquid channels after its own outlets are closed, consequently jaundice; and possibly this, too, is the reason for the cardiac arrhythmia so often observed both in jaundice and gall stones.

Often a calculus may entirely fill the gall-bladder and yet no symptoms be observed. If it be true that the gall-bladder contractions are due to a gall-bladder secretion, it can be seen how the atrophy of these glands from pressure would cause both the cessation of bladder secretion and contractions.

Gall stone colic is universally regarded as due to impingement of the ducts upon calculi; hence, bile and secretin to stimulate contractions must be present in those cases, and therefore pain should be regarded as a favorable symptom. Of course if jaundice be present, clay stools denote the absence of bile; however, jaundice is sometimes absent, and clay-colored stools present. This should be regarded unfavorably, since we recognize the absence of the secretion as well as secretin, and the liver itself is involved.

When jaundice is present the symptoms become those of cholemia, the urine contains bile, and the nervous phenomena are all accentuated. As to the relative elimination of cholesterin by the intestinal

epithelium during jaundice, we would expect an attempt at compensation on the part of the bowel. In those cases in which gall stones are spontaneously thrown off, the natural secretions have probably reached that point in their effect upon calculi of long standing that disintegration and expulsion occur entirely from the natural bile solvent and bile expelling mechanisms; hence, a favorable prognosis in these cases.

Fever in uncomplicated cholelithiasis is rare. Suppurative cholecystitis is apt to exist if chills and fever are present. This condition is possible when bacteremia exists, or rarely from intestinal infection.

In regard to the possibility of "gall stones running into cancer": We might talk as intelligently of "malaria running into typhoid." Cancer of the biliary structures is almost certain to be attended by gall stones, because of the products of inflammation, the altered secretions, and stasis. Personally, I have never seen a case of recognized gall stones in which it could be said a malignant growth developed after the formation of the biliary concretions. Malignant growths complicate gall stones in from four to fourteen per cent. of cases. Gall stones complicate malignant growths of the gall bladder in more than ninety per cent. of cases.

The treatment of cholelithiasis is prophylactic, palliative and curative. Prophylaxis embraces care of the pregnant and menstruating woman, of infectious fevers, of toxemia, of diathetic, hygienic, occupational and anatomical factors.

In all gall stone cases, as well as in those predisposed, the diet should be such as tends to minimize the organic acids, and increases the oxygen in the system; hence, all lentils, white meats, milk, especially butter milk, and hot white meat broths or certain vegetable soups; large quantities of hot mineral or plain water, especially an hour or so before breakfast. These hot fluids, even starvation diet, promote the secretion and excretion of bile, and thus freshen and strengthen bile secretions and hepato-cystic contractions. Contrariwise, no tea, chocolate, tomatoes, strawberries, bananas, cantaloup, red meat, nor yeast bread, should be permitted.

Butter milk makes the ideal food; it stimulates the flow of secretin, it is rich in lecithin, and lessens the organic acids in the system. An abundant use of saline or pure water may avert the cholesteremia of pregnancy and the menstrual periods.

Both the feces and urine should be constantly observed. In infectious fevers and toxemic conditions the secretion and elimination of bile should be observed and stimulated from time to time, especially by the true benzoates and salicylates; urotropin is also serviceable. Gastro-enteroptosis, floating kidney, or other anatomical factors should be corrected. Occupational habits may be reversed; and diathetic defects overcome by favoring oxidation.

Palliative treatment embraces the care of the acute colic or sudden symptoms that may arise. Often curative treatment instituted at once will relieve the acute attack. The pain, the digestive disturbances, and sometimes the heart action, demand especial care. The acute gall stone colic must be from the impinging of the gall bladder and ducts against calculi; hence, such measures as quiet the rhythmic or spasmodic contractions promote biliary secretion and favor cholesterin disintegration are indicated.

Valerianate of amyl quiets the spasm of the gall bladder musculature, stimulates the heart action, and has wonderful solvent effect upon cholesterin. Both are alcohols of the terpene class. Olive oil, glycerine, and most lecithin-bearing substances exert solvent action upon the cholesterin and quiet the gastralgic manifestations. Two pints of hot cotton-seed oil as an enema will often overcome the spasm. Virchow and Thoma and others have shown that lecithin, oleic acid and other fats are eliminated by the epithelium of the gall bladder; hence, the action of olive oil and its class not only in disintegrating cholesterin concretions, but also in relaxing the bile ducts.

Morphine is rarely necessary if the foregoing medication be supplemented with abundant ingestion of hot water. Morphine retards secretion, delays elimination, and makes more difficult the effect of curative remedies.

The curative treatment embraces many drugs that possess similar effects. Few thinking minds of today question the disintegration of cholesterin concretions. The question of medicine or surgery is very clear, very definite, and no more conflict of thought should occur than in the question of when to amputate the leg. The disintegration of cholesterin means the breaking up of nearly all gall stones, since most gall stones possess cholesterin in at least eighty per cent. The bilirubin-calcium is left then to be expelled in the form of bilesand.

The *x*-ray rarely radiographs cholesterin concretions, but the calcium concretions will be skiagraphed. Acute suppurative cholecystitis or cholangitis may demand drainage at once. Therefore, the indications for surgical intervention are failure to get immediate results from proper medication, especially in those cases complicated by suppuration, and those cases showing positively by the *x*-ray.

The aching and pain of adhesions may persist some time after the evacuation of gall stones. Many experienced surgeons have been greatly chagrined by cutting down upon a clean gall bladder that showed only adhesions.

Medical treatment has definite purposes to accomplish. After the attack has been quieted, such medication as will best break up the concretion is to be administered. Lecithin, the oleates, the bile salts, valerianate of amyl, the succinates, all enrich the solvent power of the bile, and are excreted into the biliary passages by the lining of epithelial cells. Secretin causes an increase in the secretion of normal bile and stimulates the expelling mechanism; hence, it should be administered before meals, i.e., at the time normal secretion and rhythmic contractions should normally take place. This may be judiciously repeated anywhere from the ingestion of food to the fourth hour. Since thyroid secretion increases the flow of blood through the abdominal viscera, it should be administered at the same time as the secretin, that the function of the secretory organs may be assisted. If it be necessary to administer posterior pituitary secretion, it should likewise be given at the time rhythmic contractions should be stimulated.

Dioscorea villosa both relieves the pain and spasm and favors the expulsion of the stone. It should be used in about twenty drop doses of the fluid extract and administered during this same period—from ingestion of food to the maximum of elimination. Carduus marianus, cambogia and chionanthus possibly favor visceral blood supply, and in this way assist cysto-hepatic tone.

Fabiana imbricate, or pichi, is perhaps the most active of any drug now possessed in its effect upon the mucosa. It promotes secretion, "modifies or cures chronic purulent discharges of the mucous membrane" (Shoemaker), and causes disintegration of the mucin in calculi. It is well borne by the stomach, and best administered in soft capsules containing three or five minims of the oleo-resin. Hydrochloric acid and the chlorides, we now understand, stimulate secretin and should be used accordingly. Carlsbad and the mineral waters not only favor a normal bile flow, but lessen the organic acids in the system. Sodium phosphate is the best of all the alkaline aperients, because it is eliminated with the bile (by the bile epithelia), thus increasing the fluidity and alkalinity of the bile.

Thus treatment may be outlined: Two hours or more before breakfast, copious draughts of hot sodium phosphate solutions, possibly with a capsule containing three or five minims of valerianate of amyl; just before breakfast a full dose of some secretin preparation; twenty drops of the fluid extract of dioscorea may be administered at this time, and the patient instructed that the disagreeable sensations arising in the stomach simply show the desired stimulation is being obtained. In fatty subjects thyroid secretion may be administered in small doses. In cases with arhythmia the posterior pituitary substance should be administered, preferably an hour before meals.

Two hours or more after meals the lecithin-bearing drugs, as glycerine and olive oil, may be administered. Bile salts, succinates, the benzoates or salicylates, when administered, had best be given at this time also. Pichi may be given after meals, preferably with hot water. Carbonated waters should not be given.

At bedtime larger quantities of lecithin and the fatty acids may be given; also the enema of two pints of hot cottonseed oil about every third night. This will often be retained until morning. Urotropin is serviceable in cases of infection, in suppurative cholangitis, and cholecystitis.

While time is required to effect complete disintegration and expulsion of some biliary concretions, favorable indications are often observable immediately. Jostling upon trains, etc., should be avoided, and the diet insisted upon.

The points to be summarized are:

(1) That biliary concretions, for the most part, are composed of cholesterin, which is a normal constituent of bile, a mono-atomic alcohol easily broken up by again restoring bile to normal.

(2) That cholesterin precipitation occurs only in stagnated, decomposed bile.

(3) That the rhythmic contractions of the gall-bladder musculature is probably due to its secretin, which is similar to the secretin of the duodenum.

(4) That medication should aim to alkalinize the bile, stimulate the bile secreting and excreting mechanisms by activating biliary secretin, and aid biliary antisepsis and mucosa tone.

(5) Also that necessary surgery is in no way deprecated.

KIDNEY INFECTIONS.

"Physical examination will show some tenderness over the pubes in acute cystitis. In kidney infections the physical findings are insignificant when compared to the general symptoms. If the infection is acute there is usually some tenderness over the kidney, and sometimes, in thin individuals, the kidney may be palpated, but not, as a rule, unless the kidney is enlarged. If one can feel an enlarged or even a tender kidney, it is worth a great deal in making a diagnosis. In most cases the kidney cannot be felt, and in most of the chronic cases there is very slight tenderness."—W. W. COBB in the *Texas State Journal of Medicine.*

ACCIDENTS DURING AND FOLLOWING GENERAL ANESTHESIA.*

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Anesthetic accidents may be classified as *primary* and *secondary,* or immediate and remote. Under primary or immediate would be classified those accidents which occur during induction of narcosis and those which occur during surgical anesthesia. In the secondary or remote group would be classified accidents which occur after the completion of the operation. In the first group would be placed death, temporary cessation of respiration or circulation, injury to the tongue, teeth, pharynx or eyes, dislocation of the jaw, ether spray entering the pharynx or trachea, and rupture of the lung by overdistension as in intratracheal insufflation anesthesia. In the second group would be placed pneumonia, acid intoxication, nephritis, peripheral and central paralysis, nausea, vomiting, and hiccough.

DEATH UNDER ANESTHESIA.

Death, the most unfortunate and terrible of all accidents, occurs in the hands of the most expert and careful anesthetists, and this is especially true if chloroform is being or has been administered. However, it cannot be gainsaid that many deaths are due to a lack of training, carelessness or a too great confidence in the safety of the agent being administered. Those who are not observant or attentive to detail in other branches of medicine, although properly trained, will never make first-class anesthetists, either from the viewpoint of the patient's welfare or the surgeon's comfort. Deaths during narcosis, which are not due to hemorrhage or when the patients are not moribund on entering the operating room, are due to the anesthetic. Deaths due to operative measures occur after the patient has been returned to bed. There are recorded a few deaths on the table from cerebral hemorrhage in patients suffering from sclerotic arteries, or due to central paralysis caused by an overdose of the anesthetic or to morphin acting upon the respiratory center, or to cardio-vascular paralysis produced by a toxic dose of the anesthetic, or to cerebral anemia caused by the sudden sitting posture in which patients are occasionally placed for head, throat, or chest dressings. In choloroform toxemia, the arterial tension is so lowered that the blood supply to the respiratory center is reduced, and breathing fails from this cause as much as from the sedative action of the anesthetic. Death may also be due to asphyxia, as in administering nitrous-oxid with an insufficient amount of oxygen. An overdose of nitrous-oxid always induces muscular spasm within or about the air passages, so this respiratory failure is of a different type from paralytic respiratory failure.

When chloroform is being administered and death occurs during the induction of the narcosis, it is usually due to a too concentrated vapor, especially if the patient has an enlarged or fatty heart, or if he struggles or holds his breath and then inspires deeply. The extra amount suddenly brought to the heart may paralyze it. Dilatation of the sphincter is usually accompanied by deep inspiration which makes chloroform dangerous at such a time. This danger is practically nil if ether is being administered. For these reasons it is much safer to induce narcosis with ether, even though it should be desirable later to employ chloroform. With modern appilances for the administration of ether by vaporization, the field of usefulness for chloroform has been very materially lessened.

OBSTRUCTED RESPIRATION.

Obstructed respiration may be caused by the tongue falling back in the pharynx. This accident will never occur if the head is kept turned well to the side. However, it is often impossible in short, fat, thick-necked subjects to turn the head to the side, and to add to the difficulty, when the patient is placed in the Trendelenburg position the tongue frequently becomes much swollen, practically filling the mouth. In the throat enlarged tonsils, inflammatory swellings of the neck, retropharyngeal abcess, and foreign bodies in the mouth are all local causes of obstructed respiration. In the nose, collections of adenoid tissue, deflected septum or tumors, and swelling of the mucosa of the turbinate bones may obstruct respiration by completely blocking the airway if the mouth is kept closed. Any condition which narrows the air passages may, on account of the congestion due to the anesthetic and aggravated by the position of the patient, completely obstruct respiration. In such an event, a mouth-gag should be inserted and the tongue gently drawn out, which will carry the epiglottis forward, making a clear airway. Care should be taken not to injure the tongue on sharp, ragged teeth; furthermore, forceps should not be used on the tongue because of the great suffering caused by such a mutilating practice. By placing a piece of gauze over the first finger and thumb, the tongue may be easily grasped and held out without injury. By placing the fingers behind the angle of the jaw and pushing

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it forward, a free airway is usually obtained, unless the alveolar processes are absorbed, in which case the lips may close and act as a valve, preventing the entry of air, especially if the patient has nasal obstruction. Usually holding the lips apart suffices, but it may be necessary to draw the tongue out. In the larynx, trachea, and bronchi, obstruction may be due to foreign bodies, blood, or fluids coughed up from the chest, as in lung abscess, or vomited from the stomach and aspirated back into the air passages. Spasm of the glottis may occur with ether or chloroform and during light or deep narcosis. It may be distinguished from other forms of obstructed breathing by the peculiar *crowing* sound due to the narrowed orifice. This condition is brought about by the administration of a too concentrated vapor and is relieved by allowing all air for a short time or by a less concentrated vapor. Enlarged thyroids or tumor masses may press upon or deflect the trachea and interfere with breathing, or the gland may be so adherent to the trachea that, in removing it, traction completely obstructs respiration In such an event, operative procedure must be occasionally suspended for a few moments till the blood is reoxygenated.

The diaphragm is the most important muscle of respiration, and its movements should not be impeded. The lithotomy and Trendelenburg positions may dangerously hamper respiration in the obese and emphysematous. Any condition within the chest or abdomen which interferes with the proper movements of the diaphragm, as pleurisy with effusion, large abdominal tumors, free fluid, and marked tympanites, all mechanically affect respiration. Under such conditions the blood oxygenation may be sufficient while a patient is conscious, but becomes insufficient under a general anesthetic. The question as to whether respiration or circulation ceased first occasionally arises and it has been urged that inasmuch as the conclusions of the Hyderabad Commission were based upon investigation with healthy animals, the results are not comparable to what might occur in sick human beings. With this thought in mind, I recently anesthetized to death with ether and chloroform animals (dogs and rabbits), which had been used for experimental bacteriologic studies, and others which had been used in teaching operative surgery in Rush Medical College. These animals could hardly be considered normal. With a single exception there was a primary arrest of respiration; however, there were several instances in which the cessation of respiration and circulation might have been thought simultaneous, if such close observation were not being made. These findings are in accord with the conclusions of both the Hyderabad Commission and many private investigators.

It is unsafe to transfer anesthetized patients from one table to another, especially if they are obese and have myocardial degeneration, or if the lung capacity is limited so that normal respiration is hindered. In suspended respiration a clear airway must be secured and maintained, all clothing removed from the chest, and the diaphragm watched for movements. If moving ever so slightly, artificial respiration should not be employed because of the impossibility of coördinating the movements, and consequently more harm than good would be done. If the diaphragm is moving the chest wall should be grasped and compressed during expiration and then suddenly released. The elasticity of the chest wall produces an expansion when pressure is relieved and air rushes in. This procedure should be continued till breathing is well established. If, however, the diaphragm stops, artificial respiration must be resorted to either by the Sylvester method or by using one of the mechanical contrivances on the market for forcing oxygen into the lungs. Capps and Lewis[1] were able to resuscitate thirteen out of sixteen dogs by passing a hard rubber tube into the trachea and "by means of a pump air was forced 15 to 20 times a minute into the lungs. A T-tube in the rubber connection provided for the escape of air between inflations and also controlled the pressure of the air during inflation." As long as the heart continues to beat an endeavor should be made to reëstablish respiration. There are several instances recorded where efforts have been crowned with success after two or three hours of artificial respiration. Dilating the sphincter and rhythmical traction on the tongue are sometimes of value.

To reëstablish circulation is more difficult than to reëstablish respiration; however, rhythmical compression of the heart either directly or indirectly through the diaphragm has been reported as successful in several instances. The abdomen has been opened with that object in view or the procedure has been resorted to during abdominal operations. Fifteen minims of the 1 to 1,000 solution of adrenalin may be injected directly into the heart muscle to stimulate contractions.

Should the anesthetic be accidentally dropped into the eyes, castor or olive oil if instilled immediately into them will in a measure prevent burning. Wet cotton makes a better protection for the eyes than wet gauze. Severe eye infections and corneal ulcers have developed from the unpardonable practice of touching the cornea for reflex action. When

using vaporizing devices, care should be taken that they are properly adjusted; otherwise a spray instead of a vapor may enter the pharynx or trachea. Occasionally in mouth and throat operations the jaw becomes dislocated. This accident is easily corrected while the patient is still asleep. Watching the amount of pressure as indicated by the manometer will prevent overdistension of the lungs in intratracheal insufflation.

SECONDARY OR REMOTE ACCIDENTS.

The secondary or remote accidents may be slight and may produce only a temporary disability, or may be severe and terminate in death. Those most to be feared are pneumonia, renal complication, acid intoxication, and paralysis. Pneumonia occurring after operations should be termed post-operative rather than post-anesthetic. In a certain sense, post-anesthetic is correct, but it is misleading, as the majority of lung complications are independent of the anesthetic. In 1896, Gottstein[2] studied a series of cases in von Mikulicz's clinic in Breslau. His conclusions were especially interesting, as up to that time it was quite generally supposed that all pneumonias which occurred after operation were due to the local action of the anesthetic, and it was thought that by using local analgesia this accident could be eliminated. He showed that as many cases developed under local as under general anesthesia. Clinical reports indicate that with the possible exception of mouth and throat operations, lung complications most frequently follow abdominal operations, especially stomach, gall-bladder, and pelvic work, with carcinoma of the stomach furnishing the largest mortality regardless of the nature of the operation. According to Wright's[7] report, 75 to 95 per cent. of all pneumonias are of the lobular type, and the right lung is most frequently involved. Other lung complications which occasionally occur are abscess, gangrene, emboli, and thrombosis. True bronchitis is seldom seen. Undoubtedly embolism and infarctions play an important rôle. Homans[8] reported the consolidation of an entire lobe following pulmonary embolic infarction. This author says: "If such instances of obvious embolic infarction occur, may not others unrecognized serve as the origin of pneumonia, abscess, or gangrene?" Bibergeil[9] reported a case of lobar pneumonia in which multiple emboli were found in the pulmonary artery. Emboli may develop from 12 hours to 3 or 4 weeks after operation. Aspirations from the mouth or pharynx of foreign substances, both solid and liquid, weak heart action with low blood pressure producing hypostatic congestions, generalized sepsis, cooling of the body surface, diminished lung expansion, morphin which allays the reflex excitability of the air passages, thereby favoring the retention of aspirated materials — all contribute their quota to lung complications.

Offergeld,[3] using rabbits, cats, and guinea pigs, administered ether alone with a closed cone, ether combined with oxygen and ether by the *drop* or *open* method, and studied the pathologic changes which took place in the lung epithelium. The results of his study clearly showed the much less injurious action of the anesthetic when given by the open method. There were no deaths and autopsy after two days showed a normal condition, contrasting with the condition found after the closed methods were used, where the mildest cases required several days for repair.

PROPHYLAXIS OF PULMONARY COMPLICATIONS

The following measures may be suggested for preventing lung complications: aseptic technic and minimum traumatism to the tissues during operation would decrease the possibility of thrombosis and embolism. Open method of etherization, allowing as much air as is consistent with narcosis, together with an even administration. The anesthesia should be as light and short as possible. No solid food should be allowed for at least six hours before operation. The stomach contents should be aspirated in emergency operations. The mouth, teeth, and throat should be disinfected as far as possible with a mild wash containing alcohol. The head should be kept turned to the side to allow mucus to escape and prevent the aspiration of vomitus. The operating table should be covered by thick pads and the patient by blankets to prevent loss of body heat, both during the operation and when being conveyed through halls and elevator shafts. Resistance is always lowered during and after operation, hence patients are more susceptible to temperature changes, and for this reason they should be well protected. In mouth, jaw, and throat operations an early awakening from the anesthetic is desirable so that a semi-recumbent or sitting position may be assumed. This very materially assists in clearing the bronchi of aspirated blood or pus.

Beesly[4] says that: "By quantitative estimation a trace of acetone is generally found in healthy urine which cannot be detected by color tests. Acetonuria of varying degrees follows the administration of every general anesthetic, but symptoms of intoxication only occur when the kidneys are failing to excrete the acetone; and when death follows, it is due to the inability of the kidneys to cope with the increased formation of acetone by a corresponding capability of excretion." He further states: "That

although ether may produce a greater acetonuria, this is less harmful than that produced by chloroform, because ether is less injurious to the liver and kidney cells and thus does not hinder their power of elimination."

He distinguishes an acute and chronic form of acetonuria and concludes that the usual risks of anesthesia are not increased by a preëxistent chronic acetonuria, but that anesthesia is dangerous with a preëxistent acute acetonuria, especially if chloroform is given. The length of the operation does not appear to influence the production of acetonuria, but it is more apt to develop after repeated chloroform administrations. In a series of 202 cases, Rice[5] found acetonuria in 90 per cent., but only about 10 per cent. showed symptoms, and in only two were the symptoms at all serious. He observed that "diacetic acid was never found unless acetone was also present, and that of the cases with acetone and free from symptoms, none showed diacetic acid." In a series of cases studied by Osgood[10] it was found that when ether was given by the closed method, 88½ per cent. of the cases showed acetone, while with the open method only 26 per cent. showed acetone. Young and Williams[6] found 75 per cent. with the closed method and 47.7 per cent. with the open method of etherization. Inasmuch as acetonuria is an acid intoxication, the rational treatment is the administration of alkalies. Bicarbonate of soda in large doses has been found most efficacious. On account of the vomiting in severe intoxication, medication per stomach is impossible, but slow and continuous rectal administrations have proved very satisfactory, or in desperate cases it may be given intravenously. Glucose is objectionable to many people and appears to be of less value than bicarbonate of soda. A meat-free diet for a couple of days with an abundance of carbohydrates and sufficient alkali to produce an alkaline urine, as suggested by J. J. Hogan, has been found beneficial as a prophylactic measure. This simple preparation renders the patient less liable to post-operative vomiting and the development of acidosis, particularly if the kidneys are at all incapacitated. Delayed chloroform poisoning has been attributed to a *fasting acidosis.*

The action of anesthetics upon the kidneys has been studied both clinically and experimentally. During narcosis the secretion of urine is usually more or less suppressed, but becomes reëstablished very soon after the anesthetic is withheld. There is an occasional transient albuminuria following both ether and chloroform. It is claimed that healthy kidneys are more apt to be affected by chloroform than by ether, and that the effects are more lasting. Many observers believe that ether albuminuria is due to a vasomotor disturbance rather than to a local irritating action. The degree of concentration of the vapor and duration of the narcosis play an important part in the effect on the kidneys as well as on the lung epithelium. It has been my observation that in chronic nephritis, if the albumen is increased at all, it is only for a day or two. However the amount of urine being secreted is of greater import than the albumen.

PARALYSIS.

Paralysis may be central, due to cerebral hemorrhage, or local, due to posture. Nerve roots or nerves themselves may be so compressed or stretched that paralysis of varying degrees results. If the arm is abducted and drawn upward a paralysis of the brachial plexus may occur. Another form of paralysis may arise from allowing the arms and hands to hang over the sides of the operating table so that the musculospiral nerve becomes compressed between the bone and table edge. Esmarch bandages or pressure of straps in the lithotomy position may also produce sensory or motor paralysis. Complete recovery usually takes place within a few days or weeks, although disablement may last for a year or longer. Sensation returns before motion.

VOMITING.

Long and persistent vomiting after operation prevents the taking of food and entails so much discomfort and exhaustion on weakly subjects that the importance of its consideration is obvious. An effort should be made to ascertain the cause of vomiting, and select remedies accordingly. The anesthetic may be the sole cause, may be only a contributing factor, or not at all responsible; therefore, the expression *post-anesthetic vomiting* like *post-anesthetic pneumonia,* while literally correct, conveys the wrong impression. Among the predisposing causes may be mentioned faulty preparation of the patient, administration of morphin before anesthesia, improper administration of the anesthetic, swallowing of blood or pus, faulty after-care, reflex irritation, faulty operative technic, nervousness, acute dilatation of the stomach, development or the augmentation of a preëxisting acidosis, and the condition which made the operation necessary. Purging and too strict limitation of the diet before operation are not to be recommended, as they exhaust the patient and disturb metabolism. Patients should not be allowed solid food, milk or chocolate for at least six hours, nor liquids, tea, coffee, or broths for two hours before a general anesthetic. There are people who are unable to take morphin without

nausea or vomiting, and if such persons are given it before operation, vomiting usually appears several hours after the operation, or at a time when it would probably have disappeared if due to the anesthetic. Uneven or intermittent administration with an insufficient amount of oxygen or air to keep the blood oxygenated increases the tendency to vomit. When vomiting is due wholly to ether, olive oil, as suggested by Graham, is undoubtedly of value. Water strongly acidulated with lemon juice and used for a mouth wash and gargle will assist in overcoming the taste and smell of ether. Cracked ice held in the mouth, teaspoonful draughts of hot water, black coffee alone or with bicarbonate of soda and champagne have been found beneficial. Calomel or enemas to establish a downward peristalsis, causing gas to escape or an evacuation of the bowels, will frequently give relief. Counter-irritants, as mustard on the epigastrium, may be of value in neurotic patients, or it may be necessary to administer a sedative as bromid per rectum. If morphin is well borne, it usually is of value in this class of patients, especially if there is much pain, but it must not be forgotten that it is apt to produce flatulency and constipation.

After mouth, jaw, and throat operations, a considerable quantity of warm water, to which bicarbonate of soda has been added, will assist in clearing the stomach of swallowed blood or pus through emesis or by washing the contents into the bowel. If food or drink is allowed too soon, it may cause vomiting when none has existed before. Reflex irritation may be responsible for vomiting as pressure from drainage tubes or clamps following operation upon the bile tracts. The vomiting which follows faulty technic, as in gastro-enterostomies, when a vicious circle develops, persists till the condition which produced it is corrected. If an acute dilatation of the stomach develops, nothing short of lavage will be of any benefit. This may be followed by a hypodermic of phyostigmin gr. 1/100 to 1/50, or strychnin sulph. gr. 1/30. Finally, the persistent vomiting of acidosis which must be mentioned is relieved only by the measures employed to combat the acid poisoning—bicarbonate of soda in large doses. Fecal vomiting ceases only when the obstruction which caused it is removed.

In intestinal obstruction and when considerable quantities of blood or pus have been swallowed it may be advisable to wash out the stomach before consciousness returns. Defective elimination of the anesthetic may be produced by hampered chest expansion through pain, tight bandaging or position. Neurotic patients occasionally develop hiccough after general anesthesia. Cocain alone or combined with atropin has been recommended and appears of value.

MEDICO-LEGAL CONSIDERATIONS.

A few remarks regarding the legal aspect of anesthetics may not be out of order. The legal responsibility for the administration of anesthetics has received little attention in the United States. It seems a travesty on justice that according to law no one but a licensed physician is allowed to prescribe drugs or perform the slightest operation, but persons with absolutely no training are administering anesthetics without hindrance, and yet there is no medicine which possesses greater power for harm than these drugs. This laxity has been largely due to a lack of interest in anesthetics quite generally felt by the profession. Too many deaths have been charged to the idiosyncrasy of the patient rather than to improper selection and administration of the anesthetic. Every one who administers anesthetics assumes a moral and legal obligation. The moral responsibility is to select the agent best suited to the physical condition of the patient and the operative requirements of the surgeon and to administer the same with the minimum of ill-effects. The legal responsibility is to show he is a regularly qualified physician and has administered the anesthetic according to recognized methods. It is assumed that he has a certain amount of skill and experience. In England an expert anesthetist may be called upon to testify as to whether the operator is a legally qualified person and whether the operation performed is a legal one. If he administers an anesthetic for a person whose name is not on the medical or dental register he is guilty of the offense of *covering* and becomes liable to punishment. If he knowingly administers an anesthetic for an illegal operation he becomes an accomplice. In case of death during an operation the anesthetist, not the surgeon, is usually called by the coroner to testify. At present in this country the surgeon is held responsible for all that pertains to the operation. The justice of this must be questioned. Undoubtedly he should be held responsible for the competency of his assistants to perform the duties assigned them. This moral obligation might involve the legal point as to their knowledge and fitness to perform the work entrusted to them. With these questions satisfactorily settled it appears only just that his responsibility should end, and the investigation be directed toward the individual actually responsible for the accident. Through the efforts of a few conscientious physicians who are extending their work along research channels, the immediate and remote effects of anes-

thetic agents are becoming known, and surgeons are slowly but surely coming to realize how important a part the anesthetic plays in their operative results. With the education of physicians comes very naturally the education of the people. Already (at least in Chicago) the prospective patient not infrequently selects his own anesthetist. This practice will be common when people realize not only the greater comfort, but what is more important, the greater safety when in the hands of a trained anesthetist.

Faulty administration and impure agents rather than idiosyncrasy are responsible for many of the untoward effects. Practical and theoretical instruction in the selection and use of anesthetics should be made an obligatory part of the curriculum in medical colleges. We grant that expert anesthetists, like expert surgeons, must possess special qualifications; still careful instruction will do much to diminish the danger incident to anesthesia.

110 S. ASHLAND BLVD.

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THE PERCY HEAT TREATMENT OF UTERINE CANCER.

It is utterly impossible to apply heat to the pelvic organs for the purpose of destroying cancer in the most effective way without opening the abdomen. With the abdomen open, the surgeon is at once made acquainted with the problem before him. More than this, he knows what degree of heat he is using, and more important than all else, he sees or feels just where he needs to apply it. Opening the abdomen in order to more effectively apply the heat and coagulation of the tissues involved in the malignant process—rather than carbonization—are two very important elements in the successful application of the technic here outlined.—J. B. PERCY in the *Pacific Medical Journal.*

Persistent localized pain and deep-seated tenderness in an extremity may be due to a *chronic, medullary* bone abscess. The roentgenogram will present the appearance of a localized osteo-periostitis. The collection of pus in the marrow cavity is not itself indicated in the plate.

A SIMPLE APPARATUS FOR THE TREATMENT OF INCIPIENT HIP JOINT DISEASE.

GRANT GOULD SPEER, M.D.,
LOS ANGELES, CAL.

In the advanced cases of hip-joint disease the conditions are very complex, each case requiring such surgical interference as is deemed necessary according to the amount of joint involved, bone destroyed, and the sinuses existing. In the incipient cases, however, the treatment resolves itself into two phases. First, extension to separate the diseased portions of the joint as far apart as possible to keep the painful parts from interfering with each other; and second, to reduce the joint to a state of immobility, which insures complete rest, decrease of inflammation and swelling, and absorption of the inflammatory matter—and in cases where the disease is far advanced to produce permanent complete immobility of the joint. To insure these two conditions a great many braces and apparatus of various sorts have been devised.

The first requisite, extension, is accomplished absolutely, with very little trouble; while the second, fixation, so long as the spine, hip, and knee retain their flexibility, can be only partially accomplished. But even as incomplete as this immobility may be, the results sought are accomplished, *viz.*, rest and complete stiffness of the hip joint.

I wish to present here an apparatus which, as far as I know, has never hitherto been described. It consists of two parts, one for night and the other for day use. That for night use is of the ordinary knee extension apparatus, for use in bed. It consists of a boot formed of plaster or any other material that can be fitted to the foot and leg, as far as the knee, ending in a bale, and split so that it may be taken off and put on as needed. To this is attached a cord, pulley, and a weight sufficient to relieve the child from pain and the usual night cries during the time it should be asleep.

For the day apparatus are required an ordinary well-fitting pair of shoes. On the bottom of the shoe for the foot of the well leg is built a cork extension of from one to three inches according to the size of the patient; on the shoe of the foot of the diseased leg, the heel is removed, and there is substituted a heel of lead, as heavy as the patient can comfortably carry. Added to these is a pair of well-fitting crutches. In a night or two, if the weights are properly adjusted, the night apparatus will be found to give the patient perfect comfort and sleep. In the morning this apparatus is re-

moved, the child is dressed as usual, and is turned out in the air to take exercise and to play with other children, except that he is expected to use his crutches and to keep the foot of the lame leg off the ground.

The objection will immediately be brought forward that while this apparatus performs extension, there is nothing between the foot and the support of the shoulders to keep the hip immobilized. However, one should remember that the line of extension is directly through the hip from the shoulder downward, and in order to steady the heavy weight the muscles of extension, abduction and even circumflexion are exactly balanced. It will be seen that through the muscles being made to work in exact opposition, we have an apparatus that immobolizes the hip even more securely than the so frequently used Thomas splint and its modification.

The first case that this was tried upon was not an incipient but a chronic one, as the destruction of the hip had progressed so far that there was a large number of healed and open sinuses upon which an acute exacerbation had taken place, causing pain, fever and a very much debilitated condition. The parents of this child, who was about eight years of age, objected to the usual cumbersome apparatus from which the child had previously suffered, and a new one had to be devised; the one described is the result.

The treatment consisted of relieving the acute symptoms of fever and pain by such drugs as were needed, and a course of malt and cod liver oil as a tonic. The sinuses were carefully curretted out by means of a small uterine curet, and irrigated thoroughly once or twice daily with a weak solution of iodine and water. The child was encouraged to keep in the open air as much as possible. The results were more rapid than any one could reasonably expect, and in a few months the sinuses were healed, the hip became thoroughly fixed, allowing the child to throw away his crutches; and he was inconvenienced only by a limp.

The second case, of which fortunately there is a radiogram in existence, was that of a young girl, daughter of a mother in the last stages of tuberculosis. She suffered a dislocation of the hip, which apparently healed under rest and extension. Later she exhibited the well marked symptoms of incipient hip joint disease. The radiogram showed a wasting away of part of the head of the femur. The apparatus was applied and a full recovery was the result.

The advantages of this apparatus over all others are, its cheapness and availability, for it can be manufactured by any physician with the assistance of a cobbler; its lightness and the ease with which it is borne; the ability of the patient to continue outdoor exercises in the sun and air, which is an important factor in the cure of all tuberculous conditions; and to these may be added the perfect results that can be attained.

THE PECTORAL MUSCLES IN BREAST CANCER

In view of what we know concerning the spread of mammary cancer, of the progressive improvement in the percentage of cures coincident with the adoption of more radical measures, the question arises whether any form of incomplete operation is ever justifiable, particularly when we consider the ultimate result of these inadequate procedures, and the more hopeful outlook following the use of the modern scientific methods producing results which can never be attained by the incomplete operation. I am aware that some authorities at present teach that the pectoral muscle can be spared when not obviously involved, but this is a dangerous teaching as has been shown recently by Lockwood[5] who noted recurrence in the muscle after incomplete operation in three cases. He states that failure to remove the muscle is followed by fifteen per cent. of recurrences, which fact is quite sufficient to justify removal of the pectoralis.—JOHN SPEESE in *The Pennsylvania Medical Journal.*

COLLES' FRACTURE

Colles' fracture is not an "office fracture," it is a "hospital fracture;" and if the fragment be accurately reduced, the special kind of splint used to retain it is of secondary importance. The problem of a Colles' fracture is one of reduction not retention.

In reducing the fracture we have found that the best results are obtained by placing the hand in the reverse position to that in which the injury was sustained. At the time of injury the hand is hyperextended and pronated. By supinating and flexing the hand the reduction can most easily be accomplished. With the patient completely anaesthetized the forearm is brought to a right angle and supinated. Traction is made upon the hand in the flexed position and counterpressure is made upon the upper fragment.

As this maneuver is done with steady traction and pressure the impaction is broken up and the fragment replaced.—WM. FRANCIS CAMPBELL in *The Medical Times.*

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WALTER M. BRICKNER, M.D., Editor
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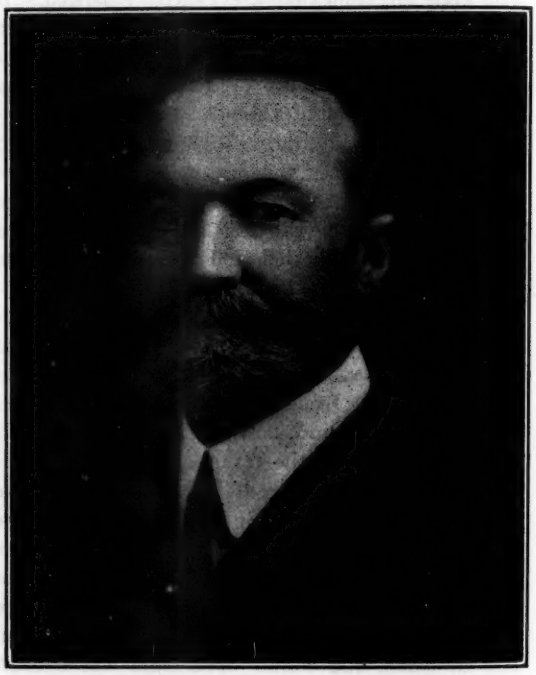
JOHN B. MURPHY.

In the recent death of John B. Murphy of Chicago, at the age of fifty-eight, there was lost to the world one of its greatest surgeons, and to America a distinguished leader—we think we may fairly say the leader—of surgical thought. Measured alone by his greatest individual accomplishments, his name must be written in the glorious history of American surgery with that of the immortal Nicholas Senn. What other surgeon has left to us so many diverse, important achievements?

The metallic button, with which Murphy's name will always be linked, and which he introduced in 1892 as a device for anastomosing hollow viscera without sutures, promptly superseded the various "bobbins" and bone plates and fairly revolutionized intestinal surgery. It was a brilliant mechanical conception based on equally brilliant surgical observations and, although it has been superseded, in turn, by present day accurate suture methods (the evolution of which it stimulated), it is still widely employed, even by the most skillful abdominal surgeons, in cases where haste is a vital factor. So complete and finished was this contribution to gastro-intestinal surgery that in the quarter-century since its introduction no modification has been found necessary in the button itself or in the technic of its employment!

Five years after the description of his button Murphy published the results of his experimental and clinical studies of vascular surgery and described a method of bloodvessel resection and suture. This, too, was a complete piece of work, pioneer work; and although Murphy's method of vessel anastomosis has been quite abandoned, it preceded by so many years the more successful methods of Carrel that it may well be recorded as a brilliant accomplishment in the development of vascular surgery, into the history of which the names of Murphy, Payr and Carrel are woven.

A year later (1898) Murphy advocated the



employment of nitrogen in the production of artificial pneumothorax to collapse and splint the tuberculous lung. This suggestion by an American surgeon attracted little attention and the method was not employed here until it came back to us, many years later, from Italy.

The "drip" method of rectal saline infusion which, like his "button," bears always the name of Murphy, shares with the Fowler position first consideration in the routine postoperative management of suppurative peritonitis. Yet the "drip" was but a part of Murphy's conception of the treatment of peritonitis; and his paper on "Perforative Peritonitis," which appeared in *Surgery, Gynecology and Obstetrics* in 1908—a masterly consideration of the minute anatomy and physiology of the peritoneum, the bacteriol-

ogy, pathology, symptomatology and treatment of pyogenic peritonitis—is one of the most interesting and most important articles in the surgical literature of the last decade.

About the same time (1907) Murphy published his articles on Surgery of the Spinal Cord, representing a large amount of original observation and study.

Murphy's latest great accomplishments were in the field of bone and joint surgery. His experimental and clinical studies of the processes of bone growth and regeneration, his contributions to the establishment of bone grafting, his original methods of treating pyarthrosis and of reconstituting ankylosed joints (the latter based on embryological data) are the most conspicuous results of these studies, and his "Contribution to the Surgery of Bones, Joints and Tendons," published in serial articles in the *Journal of the American Medical Association* in 1912, is one of the classics of surgical literature. Concerning the still mooted questions of the rôle of the periosteum in bone regeneration Murphy reached some very definitely stated conclusions, and in all the discussions of this subject his views are extensively quoted and largely accepted. Our studies of the growth and disease processes of bones and joints are far indeed from finished; the surgery of the skeletal tissues is equally undeveloped. But where this chapter in surgical history deserves to be written the name of John B. Murphy will occupy a conspicuous place in it.

These are but the most important of Murphy's accomplishments, the outstanding achievements that will carry his name to surgical generations yet unborn. They are, however, but a part of his work, a measure but not the whole measure of his greatness. There is scarcely a field of general surgery in which he did not make important contributions, diagnostic or therapeutic, or in which his technical brilliancy and originality did not shine.

His long career as a teacher has left its impression on thousands who listened to his forceful, logical expositions and observed his unique methods. His clinics were an inspiration, and even in the cold print in which they have recently been reproduced they carry an enthusiasm for accurate observation quite as remarkable as their wealth of observations and of surgical dicta.

So inspiring a teacher, so brilliant a surgeon, could not fail to have a large following in the profession and out of it!

Active in advancing the educational requirements of medicine, Murphy was himself but a high school graduate. He was, however, conspicuously honored by American and European universities, by the profession of this and foreign countries and by the Catholic church.

A mixture of various traits, Murphy's personality was always impressive. His tall figure, his high, shrill voice enunciating surgical teachings in clear, impressive sequence, will be sadly missed in the medical meetings where he had been for so many years conspicuous.

W. M. B.

DISEASES OF THE UMBILICUS.

In *The Medical Gewalt*, a small burlesque medical journal which we have written once a year for the amusement of the Mount Sinai Hospital Alumni of New York at their annual banquet, we wrote in 1913 the following mock book review:

> *Diseases of the Umbilicus.* An experimental and Clinical Study. By LINNAEUS ALBA, F.R., C.P. (Canadian Pacific), E-M-F, S.C.V., Associate Surgeon to the Asylum for Inebriates and Blind Mutes, Fellow of the Society for Placental Research, etc. In four quarto volumes; profusely illustrated. New York: ABE DOMEN PUB. CO., 1913.
>
> This exhaustive monograph is a scholarly treatise on the umbilicus, representing many years of investigation. The first volume is largely historical. It traces the development of the umbilicus from its discovery by Adam and Eve on the belly of Cain. The author describes the employment of the umbilicus by birds, reptiles and human savages for the storage of food during the rainy season, and he believes that the secretion of precious stones in the umbilicus of smugglers is atavistic.
>
> Volume II is concerned with the physiology of the umbilicus. It describes the movements of the organ in respiration, copulation and perspiration. Its prenatal function is, of course, described at length. Alba shows clearly that the umbilicus undergoes degeneration in old age. He describes several uses to which it might be put.
>
> Volume III and much of Volume IV deal with the anatomy of the umbilicus. By taking numerous plaster casts Alba has found that the umbilicus varies considerably in size, shape and number of folds. These variations are described in detail and freely illustrated. Alba concludes from these studies that the most constant anatomical feature of the umbilicus is its location in the midline of the abdomen.
>
> There are several erudite chapters on such disorders of the umbilicus as foreign bodies, pruritus, hyperidrosis, ichthyosis, pernio, etc. A short chapter is devoted to the rarer umbilical diseases —eczema, dermoid and hernia. Alba urges early prophylactic excision. There is an appendix on navel hygiene.

Now, three years later, Professor Cullen of Johns Hopkins University publishes a large treatise on this very subject!* We shall press no charges of plagiarism and we shall not further pur-

sue our claims of priority—for we are a modest, peaceful person—but we shall allow nothing (not even the fact that he had published two articles on umbilical affections in 1911 and 1912) to convince us that Cullen did not derive his inspiration from *The Gewalt* and, lest he repeat the offense, we quote here from the editorial page of that peerless publication this warning:

> *Copyrighteousness.* The matter with *The Gewalt* is covered over by copyright, all right. However, no objection will be made to its appearance in other equally disreputable journals if they do us credit.

In *The Gewalt* review we stated that the author "has found that the umbilicus varies considerably in size, shape and number of folds. These variations are described in detail and freely illustrated." Cullen devotes five pages to a description of the appearances of normal umbilicuses, and four pages to drawings by Brödel showing sixty (not fifty-seven) varieties! (These, the navels of patients at Johns Hopkins Hospital, are, it seems to us, much like those to be seen at the Metropolitan Opera House and elsewhere in New York.)

If this argument is not convincing we present another that will silence any doubter. We said in *The Gewalt*: "This exhaustive monograph is a scholarly treatise on the umbilicus, representing many years of investigation." Cullen's work fits this description exactly! It is, indeed, an exhaustive monograph and a scholarly treatise, and it must have required the full three years of investigation for its preparation. It is a richly and handsomely illustrated work, encylcopedic in its completeness, and compiled with a thoroughness of bibliographic study that represents the acme of painstaking and scientific enthusiasm. Its preparation must have cost many thousand dollars, and the profession is deeply indebted to Professor Cullen for supplying it with what will surely remain the classic reference work on the structures of the umbilicus and the urachus, their embryology and their diseases.

None of the rare affections of the umbilicus—such as the escape through it of gall-stones, of round worms, of retroperitoneal fluid, and of fetal remains, and cases even more curious and unique—has been missed in Cullen's searching study of medical literature. How extensive that study was is indicated by an index of names covering ten pages in double column!

There is no part of this remarkable treatise that is not very interesting, but, aside from the value that attaches, for reference purposes, to the case reports of rare conditions, most interesting are the chapters dealing with remnants of the omphalomesenteric duct (umbilical polyp, cyts and fistula, complete persistent duct, intestinal cyst and Meckel's diverticulum), and the chapters on tumors of the umbilicus. Cullen states that dermoids of the umbilicus are rare and that most of the cases so reported were merely umbilical concretions associated with the presence of pus, hair and sebaceous material. He believes that only six of the reported cases were true dermoids. This rather surprises us, for we have seen a few cases in which pus, hairs and cheesy material escaped through what we believed was a skin-lined sinus in the umbilical fold, from a subcutaneous, walled cavity. We regarded these as true dermoid cysts (quite like the sacro-coccygeal) and presumed that they were uncommon but by no means rare.

We have referred to this remarkable treatise outside of our reviewing column because it is a very unusual work, an examplar of bibliographic thoroughness, emphasizing how many interesting facts in medicine attach to what might appear to be a small subject. Besides, we wanted to scold Professor Cullen for spoiling our joke, and we wanted to notify the profession at large that we ourselves are preparing an encyclopedic treatise on the Anatomy and Pathology of the Ligamentum Nuchae, and a somewhat smaller monograph dealing statistically with variations in the Diameter of the Perineal Raphé.—W. M. B.

The Umbilicus and Its Diseases. By Thomas Stephen Cullen, Associate Professor of Gynecology in the Johns Hopkins University; Assistant Visiting Gynecologist to the Johns Hopkins Hospital. Large octavo; 680 pages; 269 illustrations. Philadelphia and London: W. B. Saunders Co., 1916.

Surgical Suggestions

Kangaroo tendon is sufficiently strong and sufficently resistent to absorption to be quite acceptable, in most cases, for bone suturing. Wire and metal screws, being non-absorbable, may give trouble later on.

The tampon-canula or "whistle" often inserted in the anus after hemorrhoid operations serves its chief purposes within 24 to 48 hours; and if not removed then it is apt to provoke a disagreeable and persistent edema.

After a hemorrhoid operation the patient can well bear confinement of the bowels for six or seven days (if they were thoroughly emptied beforehand); and healing is encouraged by delaying the first movement that long.

Surgical Sociology

Ira S. Wile, M.D., Department Editor.

EDUCATION FOR SAFETY.

As a vital part of the campaign to reduce accidents, education promises to assume a most prominent place. With the tremendous alteration in educational theories, the importance of industrial and vocational training has come to the fore. There is every reason to stress the value of training potential workers in factories, shops, mines and all other industrial pursuits in the principles underlying accident prevention.

While over 54,000 men and women are accidentally killed in the United States annually and over 2,000,000 are injured in the industries, the nation is guilty of indifference or neglect if no practical steps are taken to prevent this large fatality and disability. The economic loss from accidental injuries amounts approximately to $500,000. Industrial diseases in addition are responsible for an annual income loss—economic wastage—of $772,000,000. The loss from preventable accidents and diseases is greater than the present cost of maintaining all the public schools in the United States.

While the wheels of legislation are slowly moving to secure or enforce proper laws for the prevention of accidents, it is possible for the state to take long steps in advance in installing habits of safety in children and in securing the proper training of the children in our schools, who are the workers of tomorrow.

Recognizing the educational significance and the vast educational content of the "safety first" movement, the University of the State of New York has issued a bulletin on Safety First for Vocational Schools prepared by Louis A. Wilson. Herein are to be found compiled a varied assortment of advice for school boards, vocational teachers, pupils and workers. The application of safeguarding rules for protecting employees in woodworking shops, machine shops, electrical shops are carefully presented. The plumbers, the printers, the painters, the decorators, the pattern-makers, and blacksmiths have presented for their education practical experiences in the trades themselves. The organization of safety controls, safety first sayings for the bulletin board, suggestive lessons in English for foreigners, are provided so as to simplify the work of school teachers and to lay out lines of thought, the traversing of which will lead to better education and a larger measure of protection for the young employees.

For physicians participating in the fields of public education, for members of school boards, for medical inspectors, for factory inspectors, for medico-social workers interested in the problems of accident prevention, indeed for the busy surgeon daily serving the clinic, there is much of importance and value to be found in this bulletin. Familiarity with its contents will be useful to all classes in a community recognizing that cooperation is necessary on the part of the school, the employer, the employee and all other social agencies including physicians and surgeons, in order to reduce to a minimum the preventable and regrettable losses expressed in terms of the killed and injured as well as in the millions of dollars annually wasted.

THE CANCER PROBLEM.

The menace of cancer is not a theory. Frederick L. Hoffman, in his *Mortality of Cancer Throughout the World*, again points out that this disease is increasing in practically all civilized countries. Its mortality throughout the civilized world exceeds 500,000 per annum, and during 1915 there were about 80,000 deaths due to this cause in the United States. The evidence of cancer increase is not invalidated by occasional errors in death certification nor is the statement weakened, after reviewing the discussions, as to whether the increase is merely apparent or actual. The mortality rate from cancer is not due to the increased frequency of any particular type of the disease, nor indeed to an increased degree of localization in any specific organs. Practically all forms of cancer are increasing, though the degree is variable.

Hoffman points out the shortcomings of hospital statistics and urges the importance of standards with a view to facilitating the comparative study of the results of institutional treatment. The entire subject of post-operative results is shrouded in mystery owing to the lack of available data of undoubted trustworthiness. Figures are lacking to cast light on the problems of recurrence, on the average duration of the disease, on the relative degree of malignancy, on the rapidity of growth and on similar phases of the questions which merit consideration in surgical histories.

Surgical experience, at least, has proven with reasonable assuredness that cancer is non-parasitic in origin. The relation of occupations, of chronic irritations, the use of alcohol and tobacco, the part played by so-called pre-cancerous conditions, are still in the category of conditions deserving con-

siderable study in order that further deductions may be made as to the part they play in the etiology of these malignant conditions.

It is patent that cancer control is impracticable until its origin is determined. If there be a relation between gall stones, appendicitis, diabetes, ulcers, syphilis, tuberculosis and cancer, the way in which these conditions predispose to carcinoma is of the utmost importance and any facts related thereto should be ascertained. If they are not precursors of cancer in an etiological sense but are merely chronologically antecedent or coincidental diseases, it is equally important that this fact should be demonstrated. In the meantime, there remains the necessity of encouraging a rational public understanding of existing facts relative to the disease and before all stands out the imperative necessity of acquainting the people of all places and climes with the value and saving qualities of early surgical intervention.

Book Reviews

The Mortality of Cancer Throughout the World. By FREDERICK L. HOFFMAN, LL.D., F.S.S., F.A.S.A., Statistician, The Prudential Insurance Company of America; Chairman, Committee on Statistics, American Society for the Control of Cancer, etc., etc. Octavo; 826 pages. Newark, New Jersey, THE PRUDENTIAL PRESS, 1915.

This is a statistical study of cancer, based upon the mortality records of various municipalities, countries and insurance companies of the world. The records cover every phase of the question. Occupation, sex, race, anatomical and geographical distribution, etc. In addition, general cancer increase is shown to be a proven fact. There is a chapter on the relation of cancer to life insurance, general observations and conclusions upon the cancer problem, tumor classifications and an enormous number of statistical charts. The book is a true mine of information and no one interested in the cancer problem can very well be without it.

Diseases of the Digestive Tract and Their Treatment. By A. EVERETT AUSTIN, A.M., M.D., Former Professor of Physiological Chemistry at Tufts College, University of Virginia, and University of Texas; Assistant Professor of Clinical Medicine (Dietetics and Gastro-intestinal Diseases), Tufts College, etc., etc. Octavo; 552 pages; 85 illustrations. St. Louis: C. V. MOSBY CO., 1916.

This is a large, attractive volume, containing 552 pages of closely printed matter. The radiographs with which it is scantily supplied are by Dr. A. W. George.

The book is a reflection of the private practice of the author. Most of it is given up to his own notions and methods of diagnosis and treatment. Scientific references or the recognition of other men's achievements are so rare as to be practically absent; literary references are entirely omitted, except to the author's own published articles. One hundred and eighty pages are devoted to methods of examination, both laboratory and physical, about ten pages to gastric cancer, two pages to gastro-enterostomy, and half a page to cancer surgery.

The chapter on dietetics is the best written one in the book, and contains considerable information, though little of it new. Newer methods of laboratory diagnosis are altogether absent. We note also, with surprise, the almost complete failure to speak of duodenal ulcer as an entity, that whole field being covered by the term "gastric ulcer," no differentiation being made.

In general, the book serves little purpose from the point of view either of the student or of the practitioner.

Studies in Surgical Pathological Physiology from the Laboratory of Surgical Research, New York University. 1915. Small octavo; illustrated.

A collection of twenty-seven reprinted articles, edited by John Wm. Draper, who is also the largest contributor.

Progress in Surgery

A Résumé of Recent Literature.

Perforated Ulcers of the Stomach and Duodenum. R. P. SULLIVAN, Brooklyn. *Journal American Medical Association,* July 29, 1916.

Sullivan says that perforating gastric or duodenal ulcer is a most serious condition, with a very grave prognosis unless early recognized and heroically treated. The treatment is purely surgical. We occasionally hear of deaths from acute indigestion, but proper investigation would prove in most of these cases that it was from perforating ulcer. The etiology of perforation is that of ulcer in general, plus its acute termination. He describes the symptoms, which are well known and severe. Vomiting and abdominal rigidity are most significant, and when a patient is met with these and the history of previous indigestion of ulcer type, ulcer should be suspected and looked for and operation is the rational treatment. Between September, 1910, and March, 1916, Sullivan operated in twenty cases of perforated ulcer, with one death; the average duration of symptoms before operation was about six hours. The tabulation of the case is given and fuller details in the text in regard to some of them. Gastro-enterostomy was added to the closure of the perforation in ten cases. "In one it followed pylorectomy, making eleven instances. The factors that were taken into consideration as indication for the operation were: 1. The general condition of the patient would permit it. 2. The duration of symptoms was not over ten hours. 3. The site of the perforation was close to the pylorus, and closuse of it seemed to narrow the lumen to a marked degree. 4. It was assumed that by its performance the period of convalescence would be materially shortened, a factor always worthy of consideration, especially among the class of patients we meet in the wards of our city hospitals. 5. We assumed that if there were multiple ulcers, gastro-enterostomy would diminish the possibility of a second perforation. We never started out with an idea of speed; in fact, our work in each case was deliberate and careful. The average length of time taken to do the gastro-enterostomy was between thirty-five and fifty minutes. In all cases in which this operation was done, we did not encounter any increase in infection. Neither did we have any reason to regret our procedure. The patients all made satisfactory recoveries and enjoyed their semi-solid food with more relish than those on whom we did the simpler operation of suture closure." Sullivan believes that there is a place for gastro-enterostomy, and in the treatment of these cases as to drainage, soft rubber tubes draining through the abdominal wall are his preference. Post-operative care is important; the Fowler position and saline by rectum should be instituted immediately. Where gastro-enterostomy was done water was given by mouth from ten to twelve hours after operating, and forty-six hours later when the stomach was quiet, milk or other fluids in increasing amounts. In cases of simple closure of perforation nothing was given by mouth for from thirty to thirty-six hours, then small quantities of water at frequent intervals of from six to ten hours were al-

lowed, and later, with a quiet stomach, other fluids. In all cases the patients received an enema at the end of thirty hours and then daily for five days. At this time a cathartic, usually castor oil, was given. Soft solids were given the gastro-enterostomy patients on the fifth or sixth day on the average, but to the simple closure patients till the eighth or ninth day. Sullivan sums up his paper as follows: "1. The diagnosis of perforation of a gastric of duodenal ulcer should be made in the majority of cases, and the imperative indication is early operation. 2. In the treatment of cases of duodenal or prepyloric perforations, gastro-enterostomy can safely be added if patients come to operation within ten hours after the onset of symptoms. 3. Simple closure of the perforation without gastro-enterostomy is a safe routine, but later stenosis is more apt to occur. 4. Drainage can be discarded in early cases, especially if operation is performed within six hours after the onset of symptoms. 5. Early use of a liberal diet should be practiced. 6. A complete study of end-results is a necessity before any definite routine can be laid down."

Pseudo-Appendicitis. F. G. CONNELL, Oshkosh. *Journal American Medical Association*, July 29, 1916.

Connell says that the question of acute appendicitis is settled, at least for the time being. The method and time of treatment and postoperative measures are practically uniform; delay in proper treatment is usually due to uncertainty in diagnosis and the inexcusable estimated general hospital mortality of 10 per cent. is due to the failure of some one to recognize the well accepted principles of surgical diagnosis or treatment. The problem of chronic appendicitis calls for attention, not on account of high mortality rate, but of a more disconcerting morbidity rate —the postoperative persistence of symptoms. When a patient complains of the same symptoms after appendectomy as before operation. we may reasonably believe that they were not due to the appendix and that the diagnosis was incorrect. He divides these cases into two classes: those in which the proper diagnoses have been subsequently obtained and those in which the persistence of the symptoms has not been rationally explained, and which might be well called pseudo-appendicitis. Between January, 1909, and January, 1916, he has found eighty-seven records in which the removal of the appendix or the interval operation for appendicitis had not been followed by relief of symptoms; forty-eight of these were operations of his own. During the same time there were 212 patients operated on, all told, for chronic appendicitis. He gives a detailed review of these cases, not as case reports, but analyzed according to the histories and symptoms, the findings and results. In his conclusions, he says that after eliminating all demonstrable pathologic conditions that might possibly be confused with chronic appendicitis, there remains in certain cases some cause for pain and in the right iliac fossa other than the appendix, the exact nature of which is not definitely known. Such cases are frequently associated with visceral ptosis, constipation and neurasthenia. Appendicitis, either acute or chronic or when there has been an unquestioned inflammation, calls for surgery, but pseudo-appendicitis, on the other hand, is an nonsurgical condition, hence the need of a differentiation between these conditions. Every case of so-called chronic appendicitis that is associated with enteroptosis, constipation and symptoms of nervous instability should be looked on as pseudo-appendicitis, until careful and painstaking study of the history and clinical findings prove it otherwise. The advisability of seeing the patient in one of these attacks is pointed out. While an entirely satisfactory explanation of this type has not yet been found, study suggests that a lack of balance between the vagus and sympathetic divisions of the autonomic nervous system may be an etiologic factor, and this in turn may be due to an abnormal function of some of the endocrine glands.

An Unusual Stomach Case, with Roentgenographic Findings. G. E. BROWN, Miles City, Mont. *Journal American Medical Association*, June 17, 1916.

Brown describes a case of a patient who suffered from gastric symptoms which were difficult to diagnose and which gave a deceptive roentgenologic picture. Gastric ulcer was the most logical diagnosis, and an exploratory operation revealed on the lesser curvature a small outpouching of the stomach wall about the size of an English walnut, but no ulcer was found. The mucous membrane, however, bled with the gentlest handling. The hernia was plicated with three linen suture and the patient made a rapid and uneventful recovery. The clinical findings were also deceptive, but suggestive of ulcer, namely, hematemesis, occult blood in stools, gastric pain, and vomiting. The gastric diverticulum was very pronounced when the stomach was examined. It admitted the examining finger of the surgeon.

Duodenal Ulcer, Mistaken for Chronic Appendicitis. R. LEWISOHN, New York. *Medical Record*, June 17, 1916.

Lewisohn reports four cases upon whom appendicectomy had been performed and in whom subsequent examination and operation revealed a duodenal ulcer. Lewisohn admits that the differential diagnosis is sometimes very difficult, especially when we know that a chronically inflamed appendix may cause pylorospasm, pain in the right hypochondrium, vomiting and sometimes even hematemesis. Before operating upon gastric and duodenal ulcers, Lewisohn is guided by the history, the chemical findings and *x*-ray examination. Two of these factors must be positive. All four cases were relieved by a gastro-enterostomy with pyloric exclusion—two entirely, one almost entirely, and the last developed a gastro-jejunal ulcer.

The Treatment of Non-Tuberculous Bronchiectasis. HOWARD LILIENTHAL, New York. *Annals of Surgery*, July, 1916.

In discussing etiology, the post-operative bronchiectasis following tonsillectomy and the removal of adenoids under general anesthesia, especially in adults, is given prominent mention. Eight cases of this sort have been reported by Wessler as coming under his notice within a few months. Indeed, 28 per cent. of all lung suppurations coming to the Radiographic Department of Mt. Sinai Hospital, followed operations of this character.

Diagnosis: As an aid to the customary history and physical examination, the *x*-ray and the bronchoscope have proven of very great value. An expert bronchoscopist (Yankauer) could estimate the character and extent of the infection, recognize the presence of dilated bronchi, and ascertain from which lobe of the lung comes the main amount of discharge. Unsuspected radiotransparent bodies might be discovered and extracted with consequent cure in most cases of recent standing. New growths might be diagnosed by their gross appearance and specimens removed for microscopical examination.

With one of his ingenious devices, Yankauer has been able to wash out such a cavity without flooding the rest of the lung. Relief for several days may follow this procedure, which also may be useful as a pre-operative measure.

Lilienthal sounds a note of warning against diagnostic puncture performed before the actual time of operation.

Indications for surgical treatment are failure to improve under medical treatment and the demonstration (by the *x*-ray and bronchoscope) of a unilateral lesion which is not too far advanced.

Treatment: Palliative operations (drainage of the abscess cavity) are nearly as dangerous as radical (extirpation) and do not afford a permanent cure; besides, they are frequently followed by scoliosis due to the multiple rib resection.

Extirpation, "while surely a capital and dangerous procedure, *does* hold out the hope of actual cure."

Technic: The patient should come to the operating room with his lung as free of secretion as possible. An injection of morphine and atropine is given one hour before operation commences. Before starting the anesthesia, the thighs close to the body are constricted with rubber bandages so as to cut off the venous return and segregate as much blood as possible in the lower extremities. Lilienthal uses the intrapharyngeal method of

anesthesia, the narcosis being mostly carried on with nitrous oxid and oxygen, ether being sparingly used.

The position of the patient should be with the healthy side downward. For attack upon the lower or middle lobe of the lung, an intercostal incision in the seventh or eighth interspace is made, beginning at the angle of the rib and running forward to the anterior axillary line. The pleura is usually opened near the posterior end of the incision and, by inserting the finger, the opening can be quickly enlarged forward without the danger of wounding adherent lung. The rib spreader is now inserted and the ribs forced apart. If more space is needed, it can be gained by dividing the ribs adjacent to the incision at their anterior and posterior ends. Dense adhesions should be divided between ligatures.

"Adhesions between the uninvolved lobe and the chest wall should not be disturbed. Their presence is a safeguard against the collapse of the lung and also against the danger of mediastinal fluttering."

"Inspection will reveal the dusky-red, diseased part in strong contrast to the normal lung and the observation will be confirmed by palpation."

Treatment of pedicle: In these infected cases the structures of the hilum are matted together by inflammatory tissue rendering dissection time-consuming and perilous. Lilienthal therefore crushes the entire pedicle with a powerful clamp and the groove of crushed tissue is secured with a chain of chromicized catgut ligatures. The lung is now cut away beyond the line of crushed tissue and the vessels are separately secured beyond the first ligatures, the bronchial stumps are carbolized and are also once more tied but with no attempt to invert. If there are no adhesions between the remaining lobes of the lung and the chest wall, the stump is fixed by traction sutures to the thoracic wall to prevent mediastinal fluttering. (Draw over of the mediastinum to the well side upon inspiratory effort.) Very little force is necessary to steady the stump and consequently the mediastinum. Great care must be taken to avoid making undue traction upon this suture. In the presence of massive adhesions this stay suture is not necessary.

Lilienthal accepts infection as inevitable and provides for ample drainage. A few chromicized catgut sutures through the muscles approximate the ribs to a certain extent and the skin may be closed with silk leaving a drainage space for the ligature which supports the mediastinum and for the gauze drains.

The dressing consists of gauze padding held in place with adhesive straps which confine the diseased side only, no turns of bandage encircling the body. Respirations are kept down with morphine.

Convalescence is sure to be stormy. The ribs which at first are separated an inch and a half or more, gradually approach each other in from five to ten days. The slough of the stump comes away in time. In three of the cases there was a temporary bronchial fistula which closed spontaneously. Continuous suction may be employed to remove discharges if these are profuse.

Convalescence in the open air has been found of great value.

At the end of his article Lilienthal gives two tables of twelve cases treated by palliative operations; one was cured, five were somewhat improved and six died. Radical extirpation of the lesion showed seven cases, four well and three dead.

Recent Progress in the Operation Treatment of Empyema of the Thorax. HOWARD LILIENTHAL and MARTIN W. WARE, New York, *Medical Record*, July 15, 1916.

The authors believe that the treatment of empyema has been neglected in recent years, as evidenced by the appalling mortality and the frequency (25%) of secondary operations. They hold that these results are due to rule of thumb methods and that the problem centers more in the study of pathology and physiology of empyema than in mere mechanics. Lilienthal and Ware believe that the therapy should consist in two main objects: 1, in relieving intrathoracic pressure that threatens life; 2, in establishing a state which make possible a complete recovery with a minimum of complications and without deformity. As a consequence of their study, the mortality rate in 63 cases done in the past two years is lower than the rate for the previous ten years in the same hospital, and in not a single instance was a secondary operation necessary.

The theory is of immense value: 1, it shows whether the empyema is encapsulated or not and the life of encapsulation; 2, during convalescence the degree of pneumothorax can be observed and areas of consolidation may be determined; 3, in two instances an unsuspected foreign body was found; 4, sometimes the diagnosis of empyema may be shown to be false.

The diagnostic puncture should be made only with the patient on the operating table or just before the operation.

Ether should be avoided as an anesthetic. Either local, regional, nerve blocking anesthesia, or nitrous oxide and oxygen narcosis should be used.

These types of operation are called for: 1. Minor thoracotomy. This consists in simple intercostal incision with insertion of drainage tube. This operation should only be used in bad cases where relief of intrapleural pressure is imperative. 2. Major intercostal thoracotomy with exploration and lung mobilization. This operation, invented by Lilienthal, consists in an extensive resection of rib (4 to 6 inches) with thorough exploration of the thoracic cavity. All pus and coagula are removed. Adhesions are broken down, if not too dense. Intrapulmonary complications, such as abscesses, etc., should be attended to according to indication. This operation is not advised as a primary measure for desperately ill patients. 3. Thoracotomy for encapsulated empyema.

This paper is full of suggestive details and will repay careful perusal.

Bismuth Paste in Chronic Suppurative Sinuses and Empyema; Incorrect Technic as a Cause of Failure in its Application. E. G. BECK, Chicago. *Journal American Medical Association*, July 1, 1916.

Beck has gathered the published statistics of the use of bismuth paste in the cure of suppurative sinuses and abscess cavities within the last ten years, and gives them in tabulated form, with the exception of 319 nose and throat cases, which he excludes from his present consideration. The series of 527 cases from a very wide range of authorities gives an average of 80.64 per cent. of cures, with a minimum of 12.5 and a maximum of 100 per cent. Both the minimal and maximal averages occur with the smallest number of cases and might be considered less significant on that account. To ascertain the lack of uniformity shown, he has observed and conferred with other surgeons in their clinics and come to the conclusion that faulty technic is the chief cause of failure to cure. A suppurating sinus is only a contracted abscess cavity and when the small abscesses lock themselves off they empty in different regions, thus explaining the multiplicity of openings. About 20 per cent. of all cases of diagnosed rectal fistulas are only tuberculous sinuses resulting from spinal, hip joint or intrapelvic abscess, and Beck reports cases illustrating this fact. In using the bismuth method of treatment we have two advantages: It helps to avoid useless operations and gives results without operation. He describes his modus operandi, which consists of injecting a quantity of bismuth paste liquefied by heating in a water bath, and composed of bismuth subnitrate, 30 parts, and yellow petrolatum, 70 parts, into the opening of the sinus until one is reasonably certain that all ramifications are filled. It will rapidly thicken and remain in the sinuses, permitting one to take a roentgenogram. When a sinus is very long and tortuous, the paste should be injected in a liquid state, so that it will flow readily into every part of the tract. If there is more than one opening, the paste is liable to escape from the nearest one and thus miss the remaining channels. To avoid this technical error, the mouths of all the other sinuses should be compressed by an assistant, by placing the finger tips against these openings, so that the liquid will flow in other directions, filling up all channels of the sinuses. It is essential that every crevice should be filled at one injection; otherwise there will be a recurrence of suppuration. An example is given showing how a faulty technic made the physician miss the focus of infection. The common technical errors are insufficient mixing of the bismuth with the petrolatum so

as to leave small lumps, insufficient heating, use of improper instruments, injecting with undue force and the most common error is incomplete filling of the complete sinus tract. Too frequent injections and not giving the paste sufficient time to do the work and allowing the patient to dress the wound himself are also causes of failure. Complete directions as to the proper procedure, including the preliminary roentgenization and bacteriologic examinations, are also given.

Abscess of the Lung Following Operation on the Tonsils and Upper Air Tract. CHARLES W. RICHARDSON, Washington, D. C. The *Laryngoscope*, July, 1916.

Considering the nature of the wound left after a tonsillectomy it is remarkable that secondary infection is as uncommon as it is. The small number of cases of pulmonary abscess reported secondary to tonsillectomy is due to the fact that the condition does not develop until the case has passed out of the hands of the laryngologist. It has remained, says the author, for the internist and the general surgeon to recognize this complication of nose and throat surgery.

The cause is probably embolism or infection of the lung. Aspiration of blood containing cheesy concretions or small pieces of tissue is held to be a cause.

The onset of the disease is characteristic, though often overlooked. There are fever, pain in the chest and cough, with later foul smelling sputum. There are dullness over the affected area, diminished breathing and râles.

Richardson reports three cases that occurred in his practice, all adults. One was operated upon and recovered. The other two made spontaneous recoveries.

The Treatment of Fractures by Methods of Suspension and Extension. J. M. FLINT, New Haven. *Annals of Surgery*, June, 1916.

Flint found that the old-fashioned French four-posted iron beds were well adapted for the treatment of almost any injury of the extremity in which either suspension or suspension and extension were required.

Instead of attaching pulleys directly to the iron overhead frame of the bed, a spring was interposed between the pulley and the frame to act as a shock absorber. This was found to add greatly to the patient's comfort. Another trick which made for the patient's comfort consisted in a series of slings (hammocks) in which the splinted limb rested. From both ends of each sling lines led over pulleys to counter-weights which exactly balanced the weight of the suspended limb. This formed a system of automatically adjustable suspension permitting the suspended limb to roll in either direction as the patient turned from side to side.

The method of immobilizing compound fractures, resected elbow or knee, etc., by bridged plaster casts antedates the time of Esmarch and has not undergone much improvement since then. Instead of using bandages to secure the dressings of such wounds Flint has found that small scultetus binders are very convenient and economical. Various modifications of the telegraph wire splint are also depicted in the well illustrated article.

Vertical suspension in fractures of the humerus was found most useful in the early days of treatment, lessening the pain and discomfort at that time.

The mechanical advantages of combined suspension and extension are excellently depicted in the numerous illustrations accompanying Flint's article.

The Aperiosteal Stump and Its Care. H. H. M. LYLE, New York. *Annals of Surgery*, June, 1916.

Lyle is a staunch advocate of the Hirsch-Bunge method. Briefly this consists in removal of a small cuff of periosteum (half a centimeter in depth) at the time of amputation. The periosteal cuff should be removed from above downward, the marrow being scraped for a corresponding distance. More than one centimeter should never be removed on account of the possibility of bone necrosis.

As soon as the wound is healed, the medico-mechanical treatment of Hirsch is begun. This consists in massaging the stump twice daily and rubbing in a two per cent. solution of salicylic acid in olive oil. At night the stump is bathed in a warm sodium carbonate solution. The stump is protected with lamb's wool. A box placed at the foot of the bed is so adapted that the patient can press the stump against it for from five to ten minutes three times a day, then four times, and finally every hour. After each treatment the hip and knee are energetically flexed and extended. The standing exercises are then begun. The stump is rested on a bran-bag or a cane-seated chair, placing the weight evenly on both legs and later on all the weight on the stump. At the end of two weeks the patient should be able to wear a peg leg; later on a permanent prosthetic appliance is fitted; this directly receives the weight through the end of the stump.

Lyle states that no stump should be considered good unless it is capable of supporting the whole weight of the body. Moreover, if the stump is not quickly put to use as a real support it may become atrophied and useless. To prevent this, walking on a provisional peg leg should be begun within two or three weeks after the wound has healed and such a peg leg should be fashioned so that the stump takes all the weight on the end. The permanent artificial leg should be built so that the end of the stump supports the full weight of the body.

[*Note*:—Among the French crippled prisoners exchanged through Switzerland and returning to France, it was found that those who had suffered amputation possessed extremely satisfactory weight-bearing stumps which had been treated according to the above-described method.]

Fractures in Children. J. GROSSMAN, New York. *Medical Record*, July 8, 1916.

In treating fractures in children and infants one must always bear in mind the tender skin of the infant, its round agile body; and the movable cover of fat which envelopes the soft bones.

The tendency to heal is much more intense in children than in adults, the time of union is much shorter, and immobilization should be of shorter duration.

A certain percentage of fractures in children do exist with the cardinal signs of fracture lacking, the diagnosis being made in these cases by tracing the point or line of pencil or maximum bone tenderness.

Where following an injury children refuse for any length of time to use a limb, especially if their attention is distracted from the injury, or when they are at play, bear in mind the possibility of a fracture.

One must always bear in mind the necessity of proper retention, as it is just as important as proper reduction in securing favorable results.

Early massage, passive and active movements are very important adjuncts in securing satisfactory results.

Traction Bandage for Reduction of Fracture of the Leg. HOWARD D. COLLINS, New York. *Annals of Surgery*, July, 1916.

Collins describes an ingenious arrangement of a single strip of bandage three inches wide and two yards long, which is so applied to the ankle that it forms two Y-shaped hitches, one on each side, symmetrically placed. Traction upon the stem of these two Y's is sufficient to hold the foot in inversion at right angles to the leg. Plaster can then be applied while traction is maintained without any further manipulation. When the cast is completed the entire bandage is covered in except the two projecting Y stems, which can be cut off flush with the cast. As the slings form Y's instead of T's, as soon as traction is relaxed, the constricting effects of the loop immediately ceases. To protect the skin, two pieces of felt, one-quarter inch thick and four inches wide, are applied to the skin before the hitches are made. One piece six inches long is laid across the front of the ankle at the instep and the other, four inches long, over the tendo Achilles. The illustrations show the steps in applying the hitch.

The Sliding Graft and the Kangaroo Tendon Suture in Fresh Fractures: Albee Technique. WALTER LATHROP, Hazleton, Pa. *Annals of Surgery*, July, 1916.

Lathrop reports upon a series of two hundred and thirty-two fractures of various bones occurring between October 1, 1914, and December 31, 1915. Of 143 fractures of the extremities 41 were operated upon within ten days after fracture by the above mentioned method. Lathrop states that he would operate according to this method in all compound fractures of the lower leg. He believes that the Albee method offers by far the best means by which good results may be obtained without resort to any foreign body.

Treatment of Unstable Semilunar Cartilages of the Knee Joint. R. WHITMAN, New York. *Medical Record*, July 22, 1916.

Whitman holds that the best treatment for recurrent dislocation of the internal semilunar cartilage is removal of the entire cartilage. The fear in which this operation is conventionally held is, according to Whitman, not justified. The operation is very simple, takes but a very short time, and convalescence is rapid. With the leg hanging over the edge of the table, an incision is made midway between the border of the patella and the condyle, its base being just in front of the internal lateral ligament. After opening the joint, the cartilage becomes plainly visible. By extending the incision downward the cartilage may be divided into two parts and is easily removed. Complete layer suture is made and the leg placed in plaster of paris for about two weeks. The knee is then strapped with adhesive plaster to guard against strain, and the patient is instructed to walk. Recovery is usually complete in a few weeks. Whitman reports 10 cases.

Diagnosis of Periosteal Sarcoma With the X-ray. F. J. COTTON, Boston. *Boston Medical and Surgical Journal*, June 29, 1916.

In a number of cases of periosteal sarcoma, Cotton has noted a peculiar *x*-ray finding which he states in the following proposition: "In case of bone thickening, showing in the *x*-ray plate a picture of slight cortical erosion only, the presence of light stalactite-like threads of bone, perpendicular to the bone surface, strongly suggests sarcoma." Cotton has seen a more or less similar picture at *one* or *two points* in an obvious case of bone syphilis, but at all events he believes that the stalactite formation, while not absolutely pathognomonic, is nevertheless a very important diagnostic sign.

Traumatic Pulsating Exophthalmos. W. ZENTMAYER, Philadelphia, *Journal of the American Medical Association*, July 15, 1916.

Zentmayer says that, though comparatively rare, pulsating exophthalmos is of so serious and distressing a nature that the report of any operation performed for relief must be of interest. In view of the successful results of operations on the superior ophthalmic vein, de Schweinitz and Holloway are of the opinion that this operation should be considered before ligation of the carotid and certainly should precede ligation of the second carotid in case the first operation failed. A review of the later literature, however, shows that for the alleviation of the symptoms of the traumatic type at least the earlier operation of the ligation of the carotids is still usually performed. In the majority of cases there is little doubt that the lesion is a rupture of the internal carotid in the cavernous sinus and that the dilatation of the ophthalmic veins and the nasofrontal and angular veins is the result of the venous stasis thus created. It seems logical therefore to try to prevent the stasis rather than to remove the end-result, hence the preference for operations on the carotid. Another reason is that temporary unfavorable symptoms developed in three of the seven cases collected by de Schweinitz and Holloway, and that there has since been one fatal result, or they have foreseen the danger of thrombosis of the basal sinuses, a possibility emphasized by the above authors. Still another reason against the performance of the orbital operation has doubtless been that, owing to the gravity of the condition, the general surgeon has been called on with his greater familiarity of operations in the neck triangle. Zentmayer reports his case in full, together with notes of another case reported by Dr. Frederick Krauss as illustrating the dangers of the orbital operation. In his own case the carotids were operated on. The patient is still in the hospital suffering from nephritis. He also reviews the recent literature of the subject since the articles of de Schweinitz and of Bedell in 1914. His summary and conclusions includes the twenty-nine cases reviewed, and shows that there were sixteen carotid operations resulting in cure in seven, improvement in five and failure in four. Combined ligation of the carotids and ophthalmic vein was performed once, resulting in cure. Combined ligation of the internal carotid and the facial vein was done once with cure. Ligation of the orbital veins was done once, causing slight improvement. Slow ligation of the carotid was done twice, resulting in one cure and one slight improvement. Ligation of both carotids was done once with failure. Compression of the carotid and internal treatment resulted in two cures, improvement in one case and unknown result in one. Gelatin injections were used in one case with cure and there was no treatment in six cases. Combining these cases with those analyzed in Bedell's paper shows that the common carotid artery was tied thirty-two times with cure in twelve, improvement in twelve and failure in eight. The orbital operation was done in six cases, with three cures, one improvement and two failures. Gelatin injections were used in four cases with cure in two and improvement in one and failure in one. In this combined series there are thirty-two cases of ligation of the common carotid without a fatality. If late cerebral softening can be prevented by slow ligation, as is claimed, the order of surgical procedure should be slow ligation of the carotid followed by ligation of the ophthalmic vein in those cases in which the primary operation fails to cure. Apparently there can be no objections to the gelatin injection treatment being used if the patient is seen early.

The Technique of Suprapubic Cystotomy in Badly Infected Cases. HADLEY WILLIAMS, London, Canada. *Annals of Surgery*, June, 1916.

Williams dissect down to the bladder wall proper, passes two traction sutures through the muscular coat on each side close to the median line and then packs the wound from four to seven days before actually opening the bladder. This allows the formation of granulations which prevent any contamination of the paravesical cellular tissue. Thus, according to Williams' method, for vesical calculus a two-stage operation is done, and for a prostatectomy, a three-stage operation is performed.

The Danger of Iodine Solutions for Sterilizing the Skin in Abdominal Operations. A. E. WAYLAND, Glasgow. *British Medical Journal*, July 15, 1916.

Wayland has discarded the use of iodine solutions to sterilize the skin in abdominal operations because he fears that even a small amount of iodine may cause adhesions. This fear is based upon the experimental proof that iodine even in dilute solutions very easily causes adhesions. (Bertelsmann, Walker and Ferguson.)

Paralysis of the Intestine After Resection for Gunshot Injuries. O. RICHARDS and J. FRASER, *British Medical Journal*, July 1, 1916.

The authors report three cases. In all resection of a wounded fraction of small intestine was followed by obstruction, the segments of intestine above the union becoming distended, while the segment below was contracted. They believe the cause is a nervous one, arising from the injury itself and the resultant shock, and increased, perhaps, by the local peritonitis. A case in which this complication is noted may be saved by subsequent short-circuiting of the affected coil. This was attempted in two patients, one of whom recovered.